



MECH MANIA

Robot Build Rules

2024

Version 1.01

1. General

Building and operating combat robots is dangerous and must be done with extreme care. You build and operate your robot at your own risk.

The following rules must be adhered to at all times, any robots or teams that do not comply with the rules, will not be permitted to operate.

All robots will be inspected before the competition commences by one of the Robots Live crew. It is at the sole discretion of the crew member if your robot passes the inspection.

Teams are trusted that all information they provide about the operation and build of their robot is correct and that no alterations will be made once technical inspection has taken place. Anybody found intentionally not complying with the rules will be instantly disqualified from the competition and may result in further expulsion.

1.1 Robots must only be fully powered up in the arena when instructed by a member of crew. Drive systems and low speed weapons may be operated in the pits for testing purposes only and when safety devices are in place. No pneumatic systems to be operated in the pits at any time.

1.2 Robots must be able to be powered up over a 500mm high barrier when in the arena, no person will be allowed into the arena or loading bay to power up/down their robot.

1.3 When in the arena, you must only power up your robot when instructed by a member of crew.

1.4 After a fight, Robots Live crew will power down your robot, no operators are allowed in the arena until it has been made safe by the crew.

1.5 All robots must be fitted with safety covers over any sharp points, blades etc. these must remain fitted at all times when outside of the arena.

1.6 All robots must be fitted with adequate locking devices that stop the weapon operation. Locking devices must be strong enough to stop any weapon movement without failing. You may be asked to demonstrate the safe operation of your locking device.

1.7 All robots must be sat with their drive system not in contact with the bench, trolley etc. this may take the form of a cradle, trolley design etc. and be secure that the robot cannot become loose when the drive system is operated.

2. Pit Safety

2.1 Builders are advised to wear PPE where required such as; gloves, goggles and safety shoes.

2.2 Basic power tools are allowed at your pit bench.

2.3 No 'Hot Works' (such as welding and grinding) is allowed in the building at any time.

2.4 All electrical equipment (chargers, tools, extension leads etc.) must be in good

condition and free from defects. All safety guards must be present. Robots Live has the right to confiscate any electrical equipment or tools that we feel are unsafe. Some venues require PAT test on any mains electrical equipment.

2.5 Robots must only be activated for testing purposes.

2.6 No pneumatic systems to be operated in the pits. Systems may be pressurised to test for leaks etc.

2.7 All extension cables to be taped down if running across the floor

2.8 Walkways should be kept clear at all times.

2.9 All children should be accompanied by an adult at all times.

3. Weight

3.1 Maximum Weights

Maximum Heavyweight limit is 110kg

Maximum featherweight limit is 13.6kg

3.2 Weight limit includes all consumables such as gas.

3.3 Walking robots are allowed an additional 25kg. Walking robots must be propelled by legs only. Each leg must have 2 degrees of movement.

3.4 Shuffling robots that use a rolling or sliding mechanism are allowed and additional 10kg.

3.5 Walking robot types are at the discretion of Robots Live. Please advise if you intend to build a walking robot and provide as much information as possible.

3.6 Clusterbots are permitted but can be a maximum of two parts and each robot must be a minimum of 40% of the weight allowance.

3.7 Safety devices are not counted towards your weight allowance.

3.8 Robots Incorporating interchangeable weapons, parts, armour etc. must be weighed with their heaviest setup in place.

3.9 There is 0% tolerance on weight. The weight registered on the scales at the event is final.

3.10 The maximum dimensions of a robot in its resting position (i.e. weapons not operated) is 2m long, 1.5m wide and 1.2m tall.

4. Propulsion

4.1 Robots may be wheeled, tracked, legged (walker) or Shuffler.

4.2 Hovercraft or similar are allowed although please advise if you wish to enter this type.

4.3 Propellers, jet engines and rockets are not allowed.

5. Radio Control

5.1 All radio systems must be commercially available and comply with UK laws.

5.2 No radios must intentionally interfere with other users.

5.3 Only 2.4ghz frequency is allowed and must use DSS (Digital Spread Spectrum) technology.

5.4 Telemetry systems maybe used.

6. Failsafes

All drive and weapon systems must incorporate a radio fail-safe.

6.1 Fail-safes are typically built into the radio receivers, please ensure that you have the correct fail-safe setting (typically a preset fail-safe point, NOT last position/command). They should also be built into weapon switches and ESC's.

6.2 Fail-safes must activate in the result of loss of radio communication with the transmitter or loss of receiver power.

6.3 Drive systems must immediately stop in the result of a fail-safe operation.

6.4 Weapon systems should either stop where they are or return to a safe position in the result of a fail-safe operation.

6.5 Autonomous systems must disengage in the result of a fail-safe operation.

6.6 All fail-safe systems will be checked before being allowed to compete.

7. Autonomous or Semi-Autonomous Robots and Systems

7.1 Please advise Robots Live should you wish to use any autonomous systems in your robot.

7.2 All autonomous systems must be capable of being armed and disarmed remotely.

7.3 Autonomous systems must only be activated once the arena has been secured and must be disarmed during power up/down of robot.

7.4 Autonomous systems must time out after 4 minutes from first activation and not restart.

7.5 An additional indicator LED must be present on the outside of the robot to show when the system is armed.

8. Power System

8.1 All electrical power must be isolated by the form of a removable link. Multiple removable links are permitted but must be located adjacent to each other.

8.2 Removable links should be located away from any drive systems and moving weapon parts.

8.3 Removable links can be positioned under a cover/door but must not require the use of tools to open. They must be located so that they are clearly visible when the cover/door is open.

8.4 Robots that are designed to run inverted that are not equipped with a self-righting device must have either the link located in a position that is accessible when both ways up, or multiple links on each side.

8.5 The use of key switches are NOT permitted.

8.6 All cable must be of adequate current rating for its intended use.

8.7 Cabling should be routed away from moving parts and not exposed to any sharp edges that may damage the insulation.

8.8 All terminals and contacts should be insulated, there should be no exposed live connections.

8.9 Robots must be fitted with an LED light that indicates when the robot is powered up. The LED should be clearly visible and wired directly into the main power supply and not powered through any other component. Power lights should be none flashing and LED type.

8.10 All robots should be battery powered, no I.C. Engines are allowed.

9. Batteries

9.1 Maximum voltage must not exceed 75v DC or 50v AC. This is the maximum voltage and not the nominal voltage of a battery.

9.2 Batteries must be located within the body of the robot and protected from external damage. Soft mounting such as foam is advised to protect from shock causing internal damage.

9.3 The approved battery types are;

Nickel-cadmium (NiCad)
Nickel-metal Hydride (NiMh)
Sealed Lead Acid (Pb)
LiFePo4 (Lithium Iron Phosphate)
Lithium Polymer (LiPo)

Please note wet lead acid batteries, such as car or leisure batteries are not allowed.

9.4 All batteries must be charged with the correct type and shut off when charge is complete.

9.5 Lithium Polymer Batteries

- Must be charged with a balance charger
- An advisory low voltage cut-off should be fitted to the robot that either alerts the driver or shuts the robot down in the case of a low voltage alarm.
- Batteries must be charged inside a 'Lipo Sack' or similar when charging.
- Batteries should be removed and inspected before charging and before being put back inside the robot.
- Batteries must not be left unattended whilst charging
- Any batteries showing any damage or swelling must not be used.

10. Pneumatics

10.1 Only CO2 and compressed air is permitted (CO2 will be supplied by Robots Live).

10.2 Maximum system and storage pressure is 1000psi (68Bar)

10.3 All cylinders must be commercially available and designed for the intended gas. Cylinders must be certified and within their tested lifetime, and cylinders that have expired beyond this must not be used.

10.4 Burst discs must be fitted to CO2 cylinders.

10.5 Cylinders should be removed for filling, CO2 cylinders must be filled by weight.

10.6 All cylinders over 50psi must have an isolation valve fitted, for cylinders with automatic valves (such as paintball, Sodastream etc.) must have a remote valve fitted as close to the cylinder as possible. Isolation valves must be accessible from outside of the robot.

10.7 All parts of the pneumatic system over 50psi must be certified for their use at the operating pressure being used.

10.8 Any custom components must be rated for at least 120% of the operating pressure and be tested and certified. Any hydraulic components being used will be de rated to 50% of their design operating pressure.

10.9 Pressure relief valves must be fitted at each pressure stage of the system, these must be set no higher than 110% of the lowest rated component. Systems where regulators are directly mounted to the cylinder, do not require a pressure relief valve on the 'high' side, providing the regulator is rated to higher than the maximum cylinder pressure.

10.10 Full Pressure' CO2 systems (ones that are not regulated to a lower pressure) are required to have a 1000psi relief valve fitted.

10.11 Pressure gauges and permanent test points are not required, however you may be asked to demonstrate the set/operating pressure of a system.

10.12 A 'Dump' valve must be fitted that vents all of the gas from the system to air. This should be normally open. Dump valve should be located so that it is accessible from outside of the robot.

10.13 The use of heaters or any form booster is strictly forbidden. Anybody found heating any part of their pneumatic system (especially cylinders) will be instantly removed from the event.

11. Hydraulics

11.1 The maximum hydraulic pressure is 10,000psi.

11.2 A pressure relief valve must be fitted set to 110% of the lowest rated component with a maximum setting of 10,000psi

11.3 System should be fitted with a integrated test port at the maximum pressure point in the system. Teams should supply the associated gauge/hose to demonstrate the operating pressure.

11.4 Fluid should be stored in a suitable reservoir that is protected from external damage.

11.5 The operating pressure should not exceed the design rating of the components.

11.6 System should be design that no pressure can remain in the system once power is removed.

11.7 All hoses must be routed to minimise the risk of damage.

11.8 All hoses and fittings should be manufactured to BS or EU standards.

11.9 The use of any type of accumulator is banned.

12. Spring and Flywheels for Weapon Power

12.1 Any springs or flywheels must be capable of being energised and de-energised remotely in the arena, and must not be energised outside of the arena.

12.2 Energy should be dissipated when robot goes into fail-safe mode.

12.3 All springs/flywheels must be contained within the body of the robot and no part exposed.

13. Weapon Restrictions

13.1 The below weapon types are restricted or banned from use. Weapon type classification is at the discretion of Robots Live. If you feel that your weapon may fall into the below categories and be exempt please contact us first.

13.2 Rotational weapons such as saws, spinning discs/bars are not allowed. Exceptions may be made for low speed, non-destructive spinning flywheels, please get in touch if this something you are considering.

13.3 The following weapon types are not allowed under any circumstance;

Fire/Flame/Flammables

Electromagnetic Interference

RF Jamming

Electrical (Tasers etc.)

Liquid Weapons

Explosives

Smoke, dust etc. that may obstruct the view of the drivers/robots.

Entanglement

Hazardous materials

Projectiles

Hardened Blades that may shatter