

# Robo – Dangal

## • Design Specification

The team must build and bring one pre-constructed, autonomous or manual, wireless robot whose purpose is to push, throw, flip, drag or otherwise move your opponent out of a five-foot diameter circuit ring within specified time. The following section details all rules and specifications regarding this robot; please be sure to read them carefully and refer to them as you design your robot.

### Technical Inspection:-

- Robots must pass a technical inspection by the Referee and/or assigned Staff prior to being permitted to compete.
- Usually the Referee would check whether the size of the robot is matching the criteria, any loosen component, possible impact of attack which may cross the safety area etc.
- Robots that fail technical inspection may not compete until the Team rectifies identified problems and passes a re-inspection. There are no limits on the number of re-inspections; however, as soon as a team fails, inspecting Staff members will move to the next robot to be inspected. This rule does not extend or invalidate any time limits during the course of the Competition.

### Size & weight constraints:-

- The robots must come within a box that is 1.0 meter long by 1.0 meter wide by 1.5 m high at the beginning of a Battle. There are no size constraints once the Battle has begun means robot can expand its parts as well once the battle starts.
- Nothing can intentionally detach from the robot. Robots will not be immediately penalized if pieces detach as a result of breakage. In the case of repeated breakage, the Referee may invalidate a Battle, request certain remedies be taken, or disqualify a Team.
- The maximum weight allowed is **50kg** including batteries. Weight will be measured at the time of inspection before starting the competition.

- The robot can be autonomous or manual. It can have external source of control or influence (e.g. wireless or otherwise, human or programmatic).

**Radio control requirements:** Radio systems MUST NOT cause interference to other frequency users. At Robot Wars, only the 2.4ghz DSS (Digital Spread Spectrum) frequencies are allowed. Radio telemetry is permitted on 433MHz and 2.4GHz.

**Autonomous/ Semi-Autonomous Robots:** If you are bringing an autonomous robot or a robot with significant autonomous functions, you need to ensure that the function of a robot, including drive and weapons, must have the capability of being remotely armed and disarmed. Also when deactivated the robot should have no autonomous functions enabled, and all autonomous functions should failsafe to off if there is loss of power or radio signal.

**Electrical Power:** All robots must incorporate a way of removing all power to weapons and drive systems (systems that could cause potential human bodily injury) that can be activated easily without endangering the person turning it off. Voltage must not exceed 75V for direct current. Note that batteries may have a higher voltage during charging and care must be taken not to exceed these limits.

**Batteries:** If the batteries are attached to robot, it must be adequately protected within the body shell and securely fixed to minimize the chance of being punctured or coming loose during combat. In addition, packing such as high density foam is recommended to reduce the shock of impacts. Battery terminals must be protected to prevent short circuits. Approved Battery Chemistry is

- NiCd (Nickel-cadmium)
- NiMH (Nickel-metal Hydride)
- Pb (Sealed Lead Acid)
- LiFePo4 (Lithium Iron Phosphate)
- LiPo (Lithium Polymer)
- Batteries cells may be connected in parallel to increase capacity and discharge current. Caution must be taken with NiCd and NiMH as these cells may only be connected in parallel during discharge.

- LiPo batteries MUST be balance charged to prevent damage occurring to the cells. Chargers that do not incorporate an integrated balancing circuitry are not permitted.

**Internal Combustion Engines:** Fuel capacity is max. limited to 500ml (17floz). All fuel lines must be of the correct type and held with the correct type of fittings. They must be routed to minimize the chances of being cut. A return spring must be fitted to the throttle of all internal combustion engines to return the throttle to “idle” or “off” in the case of servo breakage or failure. This is in conjunction to any failsafe device. Also, The output of any engines connected to weapons or drive systems must be coupled through a clutch which will de-couple the motor when it is at idle.

### **Pneumatics:**

Pneumatic systems must use Carbon Dioxide [CO<sub>2</sub>] or Air. The maximum pressure at any point within a pneumatics system must not exceed 1000psi (68bar). The compressed gas shall be stored in a commercially manufactured gas cylinder of appropriate design, specification and certification. Except where the maximum storage pressure is less than 50psi (3.4bar). The gas cylinder must incorporate a burst disc rated below the maximum test pressure of the bottle. Except where the storage pressure is less than 50psi (3.4bar).

Regulated pneumatic systems that operate at less than 235psi (16bar) and where the regulator is directly attached to the gas cylinder do not require a 1000psi pressure relief device before the regulator. The regulator must be rated to 120% of the gas bottle burst disc pressure. A pressure relief device is required down-stream of the regulator rated at 110% of the component with the lowest ‘maximum working pressure’ rating.

**Hydraulics:** Hydraulic system pressure (In the actuator or cylinder) must be limited to 10,000psi by way of a maximum pressure relief valve. A hydraulic test point is a mandatory fitment to allow verification of a robots maximum system pressure. A team will need its own test gauge and hose. Hydraulic fluid storage tanks must be of a suitable material and adequately guarded against rupture.

**Springs and flywheels:** Any large springs used for drive or weapon power must have a way of loading and actuating the spring remotely under the robots power. Under no circumstances should a large spring be loaded when the robot is out of the arena or testing area. These devices must be made safe before removing the robot from the arena

or testing area. Flywheels or similar kinetic energy storing devices must not be spinning or storing energy in any way, unless inside the arena or testing area. These devices must be made safe before removing the robot from the arena or testing area.

**Weapon Restrictions:** The following weapons and materials are forbidden from use:  
Note: Some of the listed items may be allowed for effects but not as weapons. If you have an application of these items which you feel should be allowed, please include this in your application.

- **Active Weapons** - All robots must incorporate an active offensive weapon which is designed to damage, immobilize or seriously affect the operation of the opponent's robot. Weapon specifications must be included on your application form for approval.
- **Invisible Damage** - Weapons designed to cause invisible damage to the other robot. This includes but is not limited to Electricity, Radio Frequency, Radio Frequency Noise, Electromagnetic Fields.
- **Entanglement** - Entanglement devices such as nets, fishing line, cables, string, glues or tapes and any similar devices.
- **Heat and Fire** - Heat and fire are forbidden as weapons. This includes, but is not limited to; Heat specifically generated to damage an opponent, Flammable liquids or gases, Explosives or flammable solids such as DOT Class C devices, Gunpowder, Cartridge Primers or Military Explosives, etc.
- **Smoke and Light** - Smoke and light based weapons, which impair the viewing of robots by an Entrant, Judge, Official or Viewer. This includes, but is not limited to; Smoke or Dust, Lights such as external lasers and bright strobe lights, which may blind the opponent.
- **Hazardous Materials** - Hazardous or dangerous materials are forbidden from use anywhere on a robot where they may contact humans, or by way of the robot being damaged (within reason) contact humans.
- **Weapon Restraints** - All high speed weapons (eg. all pneumatic and rotational weapons) must incorporate a secure restraint that locks the weapon in a safe position. The restraint may incorporate locking pins and bars but must be secured

in such a way that it cannot be removed inadvertently. The design should ensure that the weapon cannot be fired during the activation process.

- **RULES and REGULATIONS**

Compliance with all event rules is mandatory. It is expected that competitors stay within the rules and procedures of their own accord and do not require constant policing.

**Team:**

A team consists of two or more members. Each team must have a captain. The captain is the person responsible for communication with referees. The team can replace its captain during the competition. Team is allowed to have only the fewest possible members beside the field during game play: they will usually be the captain and an assistant team member.

**Safety Inspections:**

- Robot Wars will be operating safety & rule compliance checks prior to any robot competing or testing during the event [Tech checks]. It is at the inspector's 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 inspection staff.
- Staff may, at their discretion, require that any safety hazards to any person, robot, or object at the venue be addressed. This may include requiring the full removal of the components posing the hazard, disqualification of a robot if a danger cannot or will not be addressed adequately, and removal of materials or persons from the premises.
- You are strongly encouraged to contact us privately via email if you have any doubts with regard to safety hazards. Staff will not divulge information provided in this way before the end of the Competition. However, we can make no guarantees about leakage of information due to e.g. hacking, electronic or physical eavesdropping, etc

**Robot maintenance:**

- Teams have approximately one (1) minute between battles. During this time, they may perform any adjustments they want to their robot, with the explicit exception of altering the software of the robot in any way.

- No technical inspections are permitted during this time; teams may not add or remove mechanisms or components except to replace them with identical components.
- Teams unready after this time has elapsed will receive a warning. On further violation of this time limit, the Referee may judge that the violating Team has forfeit the Match.
- The only exception to both the time and technical inspection limitations are for readily correctable safety issues, as determined by Staff, for which contestants may be asked to remove or rectify hazardous or broken systems.

**Personal conduct:**

- Competitors are expected to demonstrate respect and good sportsmanship towards fellow Competitors, Staff, their possessions and the venue itself.
- Competitors are required to follow Staff instructions in regard to safety, acceptable conduct, or any other instructions to ensure smooth Competition proceedings.
- Any Competitor who fails to follow such instructions faces penalties which may include verbal warnings, Match forfeiture, disqualification, or removal from the premises, depending on severity.

**Behavior:**

- Participants who misbehave may be asked to leave the competition area and risk being disqualified from the contest.
- The rules will be enforced at the discretion of the referees, officials, and local law enforcement authorities.