



Training Centers Robotics League Competition Rules

Revision Date: June 2013

1.0 INTRODUCTION

1.1 TCRL

The NTMA Training Centers Robotics League (TCRL) provides a regional structure for educational robotics competitions for the purpose of increasing traffic to manufacturing related career opportunities and to provide local NTMA chapters with a program that will invigorate and grow the organization. Qualifying robotics programs join the TCRL, which offers a fair, safe, and cost effective environment from which to build, design and compete. Student teams compete in the TCRL to prepare for the national competition in search of being the National Robotics League (NRL) Grand Champion. In addition, students are introduced to the world of manufacturing technology (including science, math, engineering, and more). Teachers and parents will be trained to support their team and also become much more attuned to the manufacturing industry.

1.2 TCRL Mission

The goal of the NTMA Training Centers Robotics League is to inspire young people to become leaders in the science, technology and manufacturing fields, by engaging them in a mentor and partnership based robotics program. We also strive to build our nation's future by promoting a resurgence of technical education and igniting a passion for designing and building in youth who have an attitude and an aptitude required for STEM related careers.

1.3 Competitions

The TCRL will hold regular events in the fall and spring (coinciding with the regular high school year), culminating in a Regional Competition to be held in advance of the National Competition. The TCRL Robotics Team will determine competition dates and location.

1.4 Contacting TCRL

For questions, comments, requests and clarifications regarding the competition rules, technical regulations and procedures in any TCRL document, contact the TCRL Program Manager.



2.0 General Information

2.1 Competition

- ❖ 15 lb. robots compete against each other in a head-to-head match.
- ❖ The match will last 3 minutes or until one robot is knocked out or taps out.
- ❖ Each event will be a double elimination tournament or round robin event depending on the number of entrants.
- ❖ Points will be awarded in the monthly events. The points in the monthly events will be used for seeding in Regional Tournament.
- ❖ Multi-bots are allowed. A Multi-bot is two or more bots with a combined weight of 15 lbs. or less that fight together against their opponent. The heaviest bot will be considered the “primary” bot. If both (or all) bots weight the same, the team will need to decide prior to the competition which bot is the “primary” bot.

2.2 Classes

TCRL’s goal is to have separate classes for High School, and Post-Secondary Schools. Initially we will be combining both classes for competitions until there are a sufficient number of robots in each class to separate the classes.

2.3 Teams

A team is defined by its name and its affiliated school. A team includes at least three students and at least one Coach and a Technical Advisor. There is no limit to the number of students allowed on a team. If the number exceeds 10, please contact the Event Organizer prior to the Competition to ensure adequate space in the pit area. Definitions and responsibilities are as follows:

- a) The Coach is ultimately responsible for the students and should be at least 18 years old and affiliated with the school. An individual may only coach one team.
- b) A Technical Advisor is someone that assists the team and offers them advice. They may be from the school or they may be from a local company. There is no limit to the number of teams a Technical Advisor helps.
- c) Students on the team must be enrolled at a high school or post-secondary educational institution. Each student must have contributed to the design and construction of the robot, and may be asked questions about the robot by a TCRL representative during a competition. A Student may only be a member of one team.

It is assumed that students do the majority of the work on the robot with adult supervision when necessary. Non-students, including advisors, coaches, and parents may not work on the robot unless they get approval from the Event Organizer. All teams are expected to be responsible, safe, and follow TCRL rules and be respectful. Fighting, and unruly or disrespectful behavior will result in immediate expulsion from the competition.



2.4 Robot Eligibility

Robots may be used in multiple years until the team decides to retire it, or the robot wins the National competition twice. We highly encourage changes and improvements to the robot if it is used in multiple years.

2.5 Resolving Problems

If there are any issues that need to be resolved, they should be brought to the attention of the TCRL Program Manager or the Event Organizer at the competition. If the issue is a Protest, the rules set forth in section 9.0 of this document will be followed. For all other issues, the Program Manager will bring the issue(s) to the TCRL Advisory Board members to discuss a resolution. This will be completed as soon as possible. In the event that there are not any other TCRL Board members available, the Program Manager will decide the outcome. The decision will be final.

2.6 Insurance

All events will have basic accident insurance coverage. Teams are advised to have their own coverage when not at an event.

2.7 Photographs and Videotaping

TCRL allows individuals to photograph and videotape the competitions. Any use of photographs or videos taken at a TCRL event need to have the TCRL logo displayed. Teams will sign a waiver stating their consent to videotaping and photography while at the competition.

2.8 Regional Competition Awards

The following winners will be recognized at the Regional Competition: Grand Champion, First Place, Second Place, Third Place, Best Documentation, Best Engineered (voted on by the judges), and Coolest Robot (voted on by the students). The Grand Champion award is determined by calculating the competition results, and the documentation/interview score.

3.0 Registration Requirements

3.1 Registration Agreement

The TCRL Registration Agreement is used to document the organization, team name, robot name, and the names of the participants. This document and the registration fee must be turned into the TCRL before competing.

3.2 Robot Transport

Once a team has checked in, and their robot has passed safety inspection, the robot must remain in the competition/pit area until they have checked out at the end of the competition.



3.3 Documentation

Robot documentation is used to explain the process that a team has used to build their robot. This documentation process also serves as a learning exercise. The documentation includes: schematics, drawings, photos, timelines, journals, etc. that show the process of building your robot. Documentation must be submitted at the safety inspection check-in, and will be returned to you prior to the end of the competition. Robots without documentation are not eligible to compete.

3.4 Team Interviews

As part of the documentation review process, documentation judges will interview team members. Every team member should be prepared to discuss the entire robot build process including planning, design, construction and strategy.

4.0 Safety Rules

4.1 Safety Glasses

Safety glasses must be worn at all times when in the pit area. This rule also applies to coaches and technical advisors. Safety is the responsibility of everyone. Non-compliance will result in expulsion.

4.2 Robots on Blocks

Robots must be on an approved block platform, so that the wheels cannot touch the ground/table when they are in the pit area.

4.3 Restricted/Prohibited Activities

Fighting, foul language or any unruly behavior is not permitted. Any violation of this rule may result in expulsion of offending person or persons from the competition. Any team involved in a restricted/prohibited activity may also lose their privilege to compete.

4.4 Smoking Prohibited

Smoking is prohibited in the workstation pits, welding and competition areas.

4.5 Alcohol and Drugs

The use of alcohol, or illegal drugs is prohibited anywhere at a TCRL Competition.

4.6 Pit Area Restrictions

Only team members are allowed in the pit area. Team members will be required to wear the ID that the event provides. This may be a wristband, ID tag, or lanyard. Guests may be allowed to view the pit area, but will not be allowed access. There may be restrictions on the number of people allowed in the pit area, depending on the number of teams and size of the area. Teams with 10 students or more, should check with the Event Organizer before a competition, to find out the pit restrictions. Aisles must be kept clear of stationary objects. Teams may use the area under the tables for storage if needed.



4.7 Footwear

Everyone in the pit area is required to wear closed-toed shoes.

4.8 Adult Supervision

When any team member is working on a robot, a supervising adult needs to be present. The coach is ultimately responsible for their team members at all times.

4.9 Robot Testing

All robots drive and weapons tests need to be performed in a test box, or arena, NOT in the pit area. Robots and controllers must not be turned on in the pit area.

4.10 Transportation of Robot to the Arena

Any robot being transported outside the pit area must have safety covers and restraints in place, and they must be completely de-activated until the robot is placed into the arena.

4.11 Weapons

Under no circumstances may any body part be placed in the path of a weapon or other moveable robot part, including during installation, activation or de-activation, or removal of any safety device. **A robot may never be picked up, or carried by, its weapon.**

4.12 Weapon Restraints

Weapons must be restrained at all times, unless the robot is in the test box, or in the arena, and will only be removed once the robot has powered on successfully. Weapon restraints must be able to prevent motion of the weapon.

4.13 Welding/Grinding

Welding and grinding are not allowed in the pit area. They may be allowed in a designated area. If allowed, there will be a professional welder provided by the Event Organizer, and grinding may be performed with the supervision of a Coach, Technical Supervisor, or member of the Event Staff.

5.0 Matches

5.1 Match Length

Each match will be 3 minutes long, unless a robot is knocked out, or taps out before time expires. In the case of a multi-bot, this is true only when it is the "primary" bot that is knocked out, or taps out.

5.2 Tournament Placement

The placement of the robots in the tournament brackets will be random in normal competition, and will be determined by season points for the Regional Competition.



5.3 Judging

Matches are judged on three criteria: Aggression, Control and Damage. If the match lasts for the entire 3 minutes, the judges will decide the winner. The winner will be the robot with the judges' majority votes. There are 3 judges; each judge is entitled to 1 vote. Judges will be using a score card to track the match. All judges must attend training before participating at a competition.

5.4 Robot Stuck Rule

Each robot is allowed one release during a match; this means if your robot is stuck on the floor, or bumper, the TCRL Referee will stop the match, release the robot, and re-start the match. Multi-bots will be allowed one release total, not one release for each bot. If both teams' robots are stuck on each other, they will be released as often as needed.

5.5 Robot Pinning

If a robot pins, or traps the other robot; they must release it after 10 seconds.

5.6 Robot Unable to Move

If a robot is unable to move during the match, the referee will begin a 10 second countdown. If that robot cannot move by the end of the countdown, it will be considered knocked out, and the other robot will be the winner of the match. The referee will decide whether the robot shows sufficient movement. In the case of a multi-bot, this is true if it is the "primary" bot. If it is not the "primary" bot, then the match continues.

5.7 Tap Out

If a team wishes to stop the match at any time, they may loudly declare "Tap Out", provided there is no "Tap Out" button. This will be an automatic loss for that team. The other team will not be allowed to attack them after they have declared a "Tap Out".

5.8 Postponements

Each team receives one postponement per competition. Postponements may last up to 20 minutes, unless both teams agree they are ready before the 20 minutes has expired. Postponed matches will be rescheduled as soon as possible, after the postponement expires. If a robot is still not able to fight, the match will be forfeited, and the other robot will be declared the winner.

5.9 Time Between Matches

There is not an established set time between matches, however, each team will be allowed at least (30 minutes)* between matches if needed. A TCRL official will inform your pit area about your scheduled matches. Please have someone present in your pit area to be notified. Failure to be available could cause your team a forfeit. * Only 20 minutes allowed at the National Competition.

5.10 Double Elimination

All TCRL events will be double elimination tournaments. Each team is guaranteed two matches.



5.11 Grudge Match

Time permitting the Event Organizer may announce the opportunity for a “Grudge Match”. Teams will have the opportunity to sign up to fight a specific opponent. Both teams are required to agree to the match, and both robots will be required to have been eliminated from the competition to be eligible. They will have a 3-minute match, and the audience will decide the winner. This is purely for fun, and it will not affect any tournament results.

5.12 Rumble

Time permitting the Event Organizer may announce the opportunity for a “Rumble”. Teams will have the opportunity to sign up to fight against an unspecified number of opponents. All the teams entering their robots must have already been eliminated from the competition. The “Rumble”, will last 5 minutes, and the robot with the most functionality at the end will be declared the winner. Tap-outs will not be permitted. This is purely for fun, and it will not affect any tournament results.

6.0 Radio Operation Rules

6.1 Spread Spectrum Radios Only Allowed

FM radios are not permitted. Spread Spectrum radios are required.

7.0 Inspection Procedure

7.1 Safety Inspectors

Each competition will have one or more Safety Inspectors. Safety Inspectors will be responsible for the scheduling of the inspections, and keeping the inspection sheets for each robot. Safety Inspectors will also be the main contact for any Safety Inspection related questions, or comments.

7.2 Internal/Functional Inspection

Each robot must pass both an “Internal”, and “Functional” Inspection before competing. An “Internal Inspection” involves inspection of all of the components inside the robot. A “Functional Inspection” involves a demonstration that the robot can safely be controlled, and meets the fail-safe requirement listed in the Technical Regulations. A copy of the inspection form will be provided to each team at registration to use as a checklist.

7.3 Official Scale

The TCRL will have at least one specific scale designated as the official scale for that event. Your robot must make weight using that scale.

7.4 Inspection Time Schedule

Safety Inspection will take place during a specified time period prior to the start of the competition. This will be posted prior to the event.



7.5 TCRL Right to Inspect/Disqualify

The TCRL reserves the right to inspect or re—inspect your robot at any time during the competition. Any additions or changes to the robot must be re-inspected before competing, as well as after any significant damage during a match. If a TCRL official feels a robot is unsafe for any reason, and it cannot be made safe, it will be disqualified, and not allowed to compete.

7.6 Match Weigh-In

All robots are re-weighed before each match.

7.7 Non-Compliance

If, as a result of re-inspection, a robot does not comply with the Rules and Regulations, TCRL officials will determine the outcome as follows:

- (a) If the non-compliance was un-intentional, & would not have affected the outcome of a previous match in which it fought, the previous match results will stand; however, the robot will need to be modified to make it compliant for future matches.
- (b) If the non-compliance was not un-intentional, but could have affected a previous match, TCRL officials can disqualify the bot and reverse decisions of previous matches. The robot will then need to be modified to make it compliant for future matches.
- (c) If the non-compliance was intentional, the robot will be dis-qualified and previous wins reversed. The non-compliant robot may be allowed to compete in future competitions.
- (d) If the non-compliance was intentional and endangered any persons, the team will be asked to leave the competition, and will not be allowed to compete for one year.

7.8 Building Cautions

Combat robot systems can be dangerous if not designed, constructed and tested properly. Damage during matches can render the robot unsafe. It is ultimately the responsibility of robot teams to ensure the safety of their system design.

8.0 Rules Enforcement

8.1 Rules Compliance

In all matters of compliance with the Rules, and any applicable civil or criminal laws, the TCRL, and its officials reserve the right to disqualify a robot or to warn, fine, or expel any team, or individual from the competition.

8.2 Expelled Individual

If an individual is expelled, they must leave the premise, and return any, and all ID's, pit passes, etc. This individual will not be permitted to compete in any future TCRL event for the remainder of the year. If the individual expelled is the adult supervisor, the entire team must leave the premises.



8.3 Expelled Team

If an entire team is expelled, they will be asked to leave the premises, and return any and all ID's pit passes, etc. They will also need to clear their pit table. They will not be allowed to compete in any TCRL event for the remainder of the year.

8.4 Criminal Offenses

If any person is in apparent violation of any Federal, State or Local laws, that person will be turned over to the local authorities.

9.0 Protests

9.1 Allowable Protests

The following items may be protested:

- (a) The Safety Inspector's decision to fail a robot during inspection.
- (b) A match forfeit due to non-availability.
- (c) Disqualification due to an inadvertent rules violation.

9.2 Unallowable Protests

The following items may not be protested:

- (a) The Judge's decision on a match.
- (b) Disqualification due to an intentional safety violation.
- (c) Disqualification due to failure to obey TCRL official's instruction.

9.3 Protest Procedure

The procedure for protesting is as follows:

- (a) The protest must be lodged within 15 minutes of the time the event occurred.
- (b) The protest should be brought to the Program Manager, or the Event Organizer.
- (c) All parties involved will be given a maximum of 5 minutes to present their side of the case.
- (d) After all parties have presented their side of the case, the Program Manager, or the Event Organizer will make the final decision within one hour after the presentations.
- (e) The decision made by the Program Manager, or Event Organizer will be final.



TCRL & NRL Glossary of Terms

Aggression - The frequency, severity, boldness, and effectiveness of attacks deliberately initiated by one robot against an opponent. If a robot appears to have accidentally contacted an opponent, the act will not be considered Aggression.

Arena - The enclosed area in which the robots fight.

Bye - A robot does not have to compete in a Round, and is automatically advanced to the next Round. Byes occur in an Elimination Tournament, when it is not possible to schedule a competitor in the current Round.

Competition - This is the overall process of using a group of Matches to identify the winner of the tournament.

Control - The ability of the robot to move in a specific and deliberate manner. Control means a robot is able to attack an opponent at its weakest point, use its weapons in the most effective way, and avoid being struck by an opponent, or its weapons.

Damage - Reduce the functionality, effectiveness or defensibility of an opponent through deliberate action. Damage is not considered relevant if a robot inadvertently harms itself. Also, if a robot fragment strikes the opposing robot it will not be considered “deliberate”.

Disqualification - A robot is no longer permitted to compete in the tournament.

Eliminations - The standard tournament format composed of successive “Rounds of Competition”. The league format is Double Elimination through the final round.

Event Organizer - The main contact person for a particular competition.

Forfeit - A robot loses a match because it was not ready to compete at the scheduled time.

Grudge Match - A one-on-one non-competition match between robots in the arena. This is reserved for two robots that have each had two losses and thus eliminated from the regular competition. It will follow the standard 3 minute match rules. Grudge Matches will be allowed when and if time permits.

Incapacitated - A robot is non-responsive. The Referee is the final authority on this call.

Judging - Matches are judged on three criteria: Aggression, Control and Damage. If a match goes the full 3 minutes, the judges will decide the winner. The winner will be the robot with the most judges’ votes. There are three judges and each has one vote. Judges will be using a score card to track the match. All judges must attend training before participating at a competition.

Knock-Out - Occurs when the attack or deliberate actions of one robot cause the opponent to become incapacitated.



Match - Any competition between robots in the arena. This includes the standard 3 minute Match, a Grudge Match, and a Rumble.

Multi-bot - Two or more robots that together meet the weight requirements. They compete as a team against their opponent. One of the bots must be designated as the “primary” bot, for judging considerations.

Pinning - One robot trapping its opponent, thus rendering it immobile for a period of time.

Pit Crew - The students, coaches, and advisors allowed in the pit area.

Postponement - Occurs when a specific Match is delayed from the originally scheduled time due to a request by one of the teams, or as needed by the Event Staff. A 20 minute time period will be given for a requested postponement. A robot may only use one postponement per competition.

Rounds - One set of Matches, where all remaining competitors are paired off & compete (or receive Byes), in order to advance in the Eliminations.

Rumble - Any competition between multiple robots in the arena. This is reserved for robots that have had two losses in the competition. There will be no Tap-Outs, no unstuck opportunities, and the match is 5 minutes long. The match will not be judged, and the winner will be the robot with the most functionality when time elapses. Rumbles will be allowed when and if time permits.

Scoring - Three criteria are used to determine the winner of a match that completes the 3 minute time limit (Aggression, Control, & Damage). Judges will be using a score card to track the match.

Spread Spectrum - Receivers that use spread spectrum technology have less of a chance of mixing with signals from other receivers. Newer receivers with a built in fail-safe are also allowed.

Tap-Out - Occurs in a Match when a driver of a robot decides that they no longer want to continue the Match, and conceded the win to their opponent. At the time of the tap out, all contact must stop.