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Judge Dave's Guide to Winning

Judge Dave (Calkins), is one of the original BattleBots judges, founding RFL member, founder of RoboGames, and co-founder of ComBots. These are his words of wisdom. Ignore them at your peril.

Since the year 2000, I have judged over 2500 robot combat matches, and watched close to 5000 (a given event can have anywhere from 100-500 matches - they add up after ten years.). All of the below rules come from watching contestants cry at the smell of burnt metal and broken dreams. Follow these rules and you'll do well. If you don't, you won't.

1. Know Carlo's Law and Live By It.

Carlo Bertocchini, builder of Biohazard (three time heavyweight champion), came up with this most-important rule, and he put it better than I can, so here it is:

"Finish your robot before you come to the competition!"

This seems too obvious to even mention, let alone to place at the very top of a list of secrets to success. Besides, so what if you just have a little wiring to do, or that one last gear to mount? It's 3:00 AM you have been working for 36 hours straight... You can do that last bit of wiring in the pits, right? Well, the fact is, if you are in this situation, you have probably already ensured a loss in the arena.

"Moe" got to the event with just a few "minor" adjustments left to do. He spent his whole day trying to work on the robot while at the same time getting through all the required safety check-ins. He was somehow able to convince the inspectors that his robot was safe and able to move under its own power.

Now it is the first day of competition. Moe is still working on his robot after having slept just two hours last night under the pit canopy. Moe found that the minor adjustments took longer than he expected, and he found a few more changes that just had to be made.

Now Moe is called to battle. He sets up his robot and steps out of the arena. The box is locked. The blue driver is ready.

"Red driver are you ready?"

"Uh, I guess."

Three thousand people watch anxiously from the stands as the starting lights count down to green... Moe's bot never moves. Three thousand people watch with disappointment and ill-disguised hatred as Moe walks in to the box to collect his robot.

What I am suggesting here is not easy. It takes good planning, discipline, and lots of free time to get the job done. But here is one simple way to guarantee that your robot will be finished: If it

looks like time is running short, rather than drive or fly hundreds of miles just to work on your robot at the venue, why don't you just leave your robot home! Come and see the show, have the time of your life, learn a few things, and set your sights on doing well and enjoying the next competition."

In other words, if it isn't fully functional the week before the event, it's probably not going to pass safety or be able to fight. It's happened countless times. Save yourself the shame. Come to the event no matter what - but if you're bots not ready, volunteer on another team.

2. Practice Driving (LTFD)

Sounds obvious, I know. So do all the other guidelines. But less that 20% of contestants obey this rule. The one's who do are the ones who win. So many competitors spend countless hours making tiny little changes to their robot to make it "perfect" that they don't spend any time driving it. A shocking number of rookies have had **no** driving practice before they step into the arena for their first match.

Listen guys, Dale Earnhardt Jr. didn't just hop into the driver's seat and start winning at NASCAR. Pay very close attention to this next sentence, because if you want to win at RoboGames, ComBots Cup, or any other competition, it's the most important thing I can say to you: The single greatest common denominator to winning is driving ability. Get that?

The first time I saw Gary Gin (three-time HW champion) and *Original Sin* and *Big Bee*, I thought it was a joke. His bots had no weapons. Exposed wheels. Soft aluminum bodies. But he drove circles around his competitors.. He deftly avoids spinning blades, flippers, and whatever else is thrown at him. He strikes and dodges -- like the finest boxer. He wins time and time again. All the greats are like that. Watching Matt Maxham (four-time champion) drive Sewer Snake is like poetry in motion. **They win because the practice driving their robots!** It doesn't matter how great your weapon is if you can't actually hit the other bot...

Spend one hundred hours practicing driving before you ever get to the event. Robot not done yet? Fine. Go spend \$20 on a cheap R/C car and drive until your robot's ready. Switch to your bot as soon as the drive train is finished, even if the weapon isn't done and the armor isn't on. Spend an hour each day driving - go find some empty lot, parking garage, or cul-de-sac. Now chase that \$20 R/C car around with your bot (let the kid next door drive the car, he's probably a better driver than you anyway.) Make sure you can catch it. Corner it. Out-maneuver it. Dominate it. When you compete, the guys you fight against are **moving**. Practicing against an unmoving target is worthless.

Got that down pat? Good. Now disconnect a motor. Learn to drive with any given motor disabled (I've seen Gary control his bot with only 1 of 4 wheels left. This came from practice, not magic.) All of these things will happen in the arena, and you can either learn now, or learn then. Your choice.

3. Be Able to Self-right

It is not a question of **if** your robot will be flipped over, it is only a question of **when** your robot

will be flipped over. I have seen competitors, their eyes filled with tears as they take their magnificently engineered robot out of the arena after a loss, saying "I was so sure we wouldn't get flipped."

Wrestlers get body slammed. Quarterbacks get dog piled. Skiers dump skis along a quarter mile path. What makes you so sure you won't get flipped? I've seen countless matches where Robot A was utterly dominating Robot B and would have won by a landslide if it were a judge's decision. But then, by bad luck, bad driving, or just a big collision, **BAM!** Robot A is upside down, and loses the match. Your robot must be able to either self-right (flipper, actuating arm, whatever) or operate upside down (wheels extend above and below the robot).

If you can't self-right, you'll never make it to the finals. Count on that. If there is any position in which your robot is a helpless kitten, count on it ending up that way at some point during the competition.

4. Simulate Getting Attacked.

OK, so you've finished your bot with a few months to spare. This is the piece of advice that you are just not going to want to take.

I want you to go to the hardware store. Buy the biggest sledgehammer you can find (the really big kind that makes you strain when you lift them.) Now raise it above your robot. And beat the living hell out of it.

Awe, did it bweak? Issums widdle wobot in a big pile uv parts??? Well, I just saved you the indignity of having that happen while 3000 people watched. If your robot cannot survive a good bashing with a sledgehammer, circular saw, and 10 foot free-fall, it will not last in the arena. Use good 6061 or 7075 Aluminum, Steel, or (preferably) Titanium. And make sure you have a good enough infrastructure to support your outer shell.

Ensure that all components are securely mounted. They're going to get knocked around. I long ago lost count of the number of battery packs that I have seen flying across the arena because they got knocked out of the bot in a big hit. If you lose your batteries, you lose the match. It's that simple.

Drop your bot off the roof of your garage. No really It's a good simulation of what's going to happen when a bot like Ziggy flips it 15 feet in the air, or a spin-bot like Last Rites whacks it once and sends it flying across the arena. Your bot has to be able to withstand that kind of hit. Even if you're the best driver in the world, you're still going to take lots of knocks (including on the bottom of your bot, so have undercarriage armor as well.) You must be able to survive those hits, and your first match is the wrong time to find out where your weak spots are.

5. Have A Weapon System.

Better yet, have two. This is robot combat. You don't play baseball without a bat, you don't go to war without a gun, and you don't become a pro-wrestler without having at least two frontal

lobotomies. If you want to beat the daylights out of the other robot, bring a weapon!

Wedges can be effective, but it's extremely rare for a wedge with no other weaponry to make it to the finals. Watch lots of matches (everything you can from youtube and other videos, or better still, buy a 3-day pass for an event) and take lots of notes. See what weapons work, and which don't. **Think about why things worked.** Two weapon systems that look identical may operate completely differently, with greatly different results.

Better yet, come up with a new and unique weapon's system. Something that hasn't been tried before. Every time I go to a competition, somebody has brought along a new robot which garnishes lots of ooh's and ah's from the masses - and more than a few times of "Why didn't I think of that?" Just make sure the weapon's allowable in the rules (no liquids and no tasers.)

6. Simulate Attacking

I swear some people show up to a competition having only ever tested their robots on kittens. Sure, it may give your garage a nice new primer coat of kitty juice, but that doesn't mean it will even scratch the paint on another 1/4" steel armored robot.

I walk the pits before competitions and between matches to see who's doing what and how this year's robots are sizing up. During one event, I saw a well designed super heavy weight with a horizontal spinning mass (that's our technical term for a big spinning hunk of metal). Except the metal bar had not a single ding on it. You can give something a nice coat of paint, but you can't hide the dings. No scratches. Nothing. On closer inspection, I noticed that the bar (which probably weighed 40 pounds) was held to the rotating shaft with a half ounce cotter pin. The kind your six-year old niece can bend with her pinky.

"You guys test this against anything?"

"Of course not, it could hurt someone!"

The first time that metal bar hit another robot, the pin sheared, the bar went flying and they were done. If they had spent five minutes in their garage or at some junkyard testing their weapon against a solid object, they would have realized the cotter pin was a weak link and they could have fixed it.

There's a term for this - "Cargo Cult" - it comes from south pacific islanders who got used to planes coming in during world war two and bringing supplies. After the war, the planes stopped coming. So islanders fashioned headsets from coconuts, built runway towers, and made landing lights. But the planes never came. Just because something looks the same, doesn't mean it will work the same. Don't be a cargo cult competitor.

And while you're testing, make sure that you're able to actually push twice the amount of dead weight as the maximum in your weight class. This will be a good simulation of a bot pushing against you. If you can't push that much weight, you're probably going to lose. A great many matches come down to pushing matches (5th round, both bots' weapons systems out, half your armor gone, and a burned out speed controller), so you need to be sure you can win under these

circumstances. It's also another time to find out if your speed controller can handle the load, or if it's going to give up its magic smoke.

7. Go To A Competition, Watch As Many Matches As You Can, And Take Notes.

And if you're a contestant and you've lost, don't go home and sulk. Go sit in the stands and watch every damned match until the finals are done. I've seen too many cry-baby first timers leave immediately after their first loss (Michael Jordan got cut from his High School basketball team - he did NOT go home and sulk.) You can learn more from other people's victories and mistakes than just your own, so sit back, relax, and enjoy the show.

And take notes. Your memory's not that good, trust me.

8. Use Good Batteries, Have Spares, And Make Sure They'll Last Five Full Minutes.

When you start building bots and playing with them, you're going to learn one lesson the hard way (you won't learn it here, trust me.) Batteries get hot. REAL hot. And they take forever to recharge. At least in robot-combat time. So you should have easy access to replace your batteries between matches. Have at least two full sets (three or four if you can afford them.) One on the charger, and one in the bot. As soon as a match is over, put your just-used batteries on the charger. Just before a match, take the fresher pair off and install them. No matter how good a driver you are, or how well built your robot is, if the batteries don't last the match, you're not gonna win.

9. Don't Let The Judges Decide The Match For You.

Matches are judged based on the full 3 minutes. The first minute is as important as the last. The fact that you kicked ass the last 20 seconds doesn't make up for the first 160 seconds when your competitor was mopping the floor with your rivets. You want to avoid narrow losses? Want to avoid a screaming match with the officials because they didn't share your belief that your completely out-of-control robot was actually using a strategy?

Simple. Go for a knockout. Don't let the match last all 3 minutes. Design your robot and operate it so that you **kill** the other robot. So the referee counts it out. Keep your fate in your hands, don't put it the judges. Judges are painfully fair and unbiased. The problem is -- **you're not**. You want your bot to win and the other team's bot to lose. TheyI don't care who wins. It's just that in a close match, they make the call. Both sides think they've won, but only one of them will be correct.

If the judges think the other robot was more aggressive and did more damage, then you're going to lose. But judges opinions don't have to matter. All you have to do is knock the other bot out. Do not hesitate. Do not unstick it. Do not try to avoid extra damage. You are there to win. There's only one way to absolutely ensure that you win:

Go for the knock out.

Every single match.

10. Read The Damned Rules.

I cannot count the number of builders who have spent hundreds of hours and thousands of dollars building their dream-come-true, and didn't spend one small hour reading the rule-book from cover to cover. You need to do this for every competition; they change from season to season.

- * Know exactly what the judging criteria are. Hint: Number of hits is not part of the judging criteria
- * Know what weapons are allowed and what's not.
- * Understand how to pass safety (if you don't pass safety, you don't compete.)
- * Understand what can get you disqualified.

If you can't spend the hour reading the rules (don't think that you know them just because you've seen every episode on TV) you probably will never get to compete, much less win.