



K-Botics, Team 2809

www.kbotics.ca

The Scouting White Papers

Qui Custodes Instituit?

Introduction

First of all why do teams scout? The answer is simple, it comes down to the fact that on the last day, the quality of the final alliance that a team on will often be the single largest factor that affects how far they'll get during the elimination rounds. This means it is crucial to have a comprehensive knowledge of all of the teams at the competition: their strengths, weaknesses, potential, and general "goodness". Scouting is the process of acquiring and utilizing this information to make an informed decision for alliance selection.

The first step towards doing a thorough job scouting, is knowing what *not* to do. Namely do not just pick the next highest seeded or even the next highest scoring team. Seeding in particular can result in some unfortunate picks. Frequently barely mobile boxes, who were teamed with good robots during the round-robin matches, climb alarmingly high due to having a good win/loss ratio.

The steps that make up the process of good scouting are in my experience:

- meta-scouting (pre-competition)
- pit scouting (practice day/early second day)
- field scouting (all through round robin)
- data processing
- alliance selection (end of day two and day three)

Meta-scouting

One part of meta-scouting consists of researching the other teams at the competition before hand.

You are trying to get a general sense of how teams perform from year to year. This is mostly important when your team does not have experience with the teams at a given regional (which will be all regionals for rookie teams). However, even if you do have a long history it can be a worthwhile exercise to give new members who want to get involved in scouting a more complete sense of the field.

The FIRST website is a good resource to get the list of what teams are registered for an event and an idea of the team's history. In the team histories you will mostly be looking for regional finalists, regional winners, and EI awards as indicators of past field performance. It should be noted however that teams past records are often not representative of how they will perform this year for a number of reasons, including the 24th robot effect (the 24th picked robot will be on a team with the first alliance captain and the first picked robot).

The Blue Alliance (www.thebluealliance.net) is an excellent resource which allows you to see a better break down of past years performances and has video archives of many past years.

The other part of meta-scouting is more social; it consists of networking with other teams before the regional competition and developing interest in the team's activities through mediums such as Twitter, Facebook, blogging, team websites, forums on Chief Delphi and whatever other methods appeal to you.

The Tools of The Trade

- master binder--a single oversized binder divided so that it has a section for every team at the regional in it (including your team).
- blank pit and field scouting sheets (stored in the master binder)
- 6 clipboards labelled with their start positions of robots on the field.
- white boards



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Pit Scouting

Pit scouting serves the purpose of collecting information about the technical capabilities, potentials and mechanisms that each robot possesses. This is usually done at the end of day one or the start of day two in an attempt to prevent it overlapping too much with the round robin matches. Pit scouting gives your scouts a good idea of what each robot is designed to do and get a general impression of the team. This data also allows you to assess the technical reasons behind what the robot can do on the field.

1. Put the team numbers for each team on the sheets to make it very clear who is scouting what (prepared by senior scout at the very beginning of tournament).
2. Form pit scouting groups:
 - someone who knows the technical subjects well enough to identify mechanisms
 - someone able to talk comfortably and confidently while getting the needed information and not offending anyone
 - someone with camera and ability to take recognizable photos of robots (team number, key features)
 - these can be the same person but group of 2 or 3 is sometimes better if scouts are inexperienced
3. Divide the list of teams at the regional between several groups of scouts.

Scouting Sheets

There should be a general section for the robots (size, top heaviness, made of x) followed by sections for the individual subsystems. It is important to avoid making subjective calls at this stage for two reasons, first off because some designs look sketchy but work on the field and because very few scouts reliably communicate their opinions in a consistent manner. A copy of our pit scouting sheet from last year is in the resources section of our website as an example. We are making improvements on last year's sheet for this year.

The primary thing to focus on is the nature of the mechanisms used to complete each different task and any unusual capabilities that they possess. The one category that will reliably show up is **drive system**. Two of the other common ones are **manipulator** (arm, kicker, sometimes better to break up into two categories e.g. arm and gripper, or intake and shooter), and **specialist task** (hanging in the 2010 game, mini-bots in the 2011)

Field Scouting

Field scouting is the process of collecting data about how each team performs in each match. When choosing seats you want to be located near the middle of the field so that you have an unobstructed view of both ends of the field and you want a block of seats set aside for your scouts with room for the 6 people using clipboards, whoever is keeping the binder organized and running the show, and someone doing data entry.

The people who are scouting robots should be able to focus well amidst a lot of noise, they should be able to make judgements about robot performance, and write clearly and quickly.

The field scouting sheet should be fairly easy to fill out quickly but still convey the important information about what each robot does each match. Avoid having scouts make subjective judgments. The sort of data you are looking for is more along the lines of how many times do they score? How are they at moving game pieces across/around the field? How do they fulfill the other objectives of the game? Do they fall over? Fail to move? Etc ... Red cards in particular are to be avoided.

The other important part of field scouting sheets are the comment sections, as this allows scouts to convey information that does not necessarily fit into the numerical categories, and provides clearer communication about how individual scout feel about a teams performance. There should be a place for scouts to put their names on the sheets that they fill out. The resource section of our website has a copy of last year's field scouting sheet as an example.



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Seeding

The seeding system is what controls who the alliance captains will be. It changes a little from year to year but it is consistently divided by win-loss and then subdivided by something related to the scores in the matches. This means that you really want to win matches, and know the seeding rules for a given year well enough to try to take full advantage of them to raise your place in the seeding order (in particular coopartition has in past years meant that it was sometimes to your advantage to help the other team score).

The current standings can be found in the pit during the competition and someone should be regularly sent to record them, as knowing who is likely to be an alliance captain will be important in determining what the draft is going to look like.

Database

Excel is your friend! Each year you should create a database which takes the raw data that you want to process, and produces easily understandable output for both individual teams and an overall summary list of the all teams' statistics. One thing to remember is that you will have to enter all the data that you want to process into the database, which is time consuming, so you should limit how many columns of data you enter.

An example of last year's database is posted in the resource section of our website. It contains data from last year's Pittsburgh Regional, however this data was edited for testing purposes, so some statistics may be adjusted.

The data base that I built consists of four different sections, or 'sheets'.

The raw data sheet: where all data is entered and recorded.

The mirror of the raw data: a copy of the raw data that needs to exist because of Excel's limitations in applying filters on different sheets, and an output zone that shows a given team's performance throughout the day.

A summary: automatically filled using a macro when it is run.

These feature can be accessed in last year's database by hitting Ctrl-A (to bring all of the matches that a team (whose number is in the criteria cell of the top of the mirror) has played up in the mirror). On the summary sheet I created a somewhat arbitrary formula weighting the different averages to produce an approximate "goodness formula".

The fourth page is just a place to write the pick list down.

Meeting

The scouting meeting is the place where at the end of the second day you decide what your pick list is going to look like. The first thing to do here is to go around the room and get the funny stories out of the way, as if you do not they tend to come up throughout the meeting and disrupt the discussion. After things settle down institute a rule of *no side conversions*. If the meeting drags on for a while it might be a good idea to tell your drive team to go and get some sleep.

The first picks are usually fairly easy as they are typically the truly outstanding teams. As you get lower in the first 16 picks (one of which will be your first round pick in the draft if you are an alliance captain) the decisions will get harder. What you are looking for for your first round pick is usually a **offensive bot that scores well**, however should you be one of the lower alliance captains you will often have to settle for a more mediocre offense bot in which case it might be worthwhile to consider using your second pick to grab another OK offense bot.

In looking at second picks, 16 to 24 on your list, these will usually be more limited in what they can do making this a good time to think about picking a **defensive bot** or a **specialist** as they can contribute to the team despite often not having that great an impact on the round robin rounds and not looking as impressive statistically.



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Pick Day

On the last day you do not need to do formal field scouting, you can just observe the teams on your pick list (and keep an eye out for any surprises) to see if they live up to your predictions. It is also important to keep track of who is what place in the seeding order as this can give you an edge in predicting what will happen in the draft ahead of time. This way you can get a better idea of what picks are likely to be left when your turn comes.

When it comes time to send your *captain* to the field for alliance selection grab a large white board and get as near your *captain* as you can (generally near the edge of the field area). Make sure that your *captain*:

- has a copy of the proposed list as updated throughout the day
- can see the white board (they will read sug
- knows what to say (e.g. “K-Botics, team 2809, sponsored by Queen’s University and Transformix Engineering, would like to request the assistance of team _____.” Other teams will then “Graciously accept” or “Graciously decline” the invitation.)

Note: if there is not a chance for you to be an alliance captain, you should accept the invitation--as long as your robot still works.

- ideally is good at convincing alliance captains who have not scouted that you have a better idea of who to pick than they do