2010 Official Competition Season Post-Mortem Analysis

Notes from 31-March-2010

Executive Summary

DEWBOT VI is the team's most capable robot ever. Our performance at the Philadelphia Regional (Drexel) was our best ever. The historical statistics tell part of the story:

Robot	Year	Competition	Qualifying Matches			Ranking			Playoff Matches			Awards
			Win	Lose	Tie	Rank	Field	Rank %	Win	Lose	Tie	
DEWBOT I	2005	Annapolis				23	55	58%				
DEWBOT II	2006	Philadelphia	3	8	0	41	46	11%				
DEWBOT III	2007	Pittsburgh	2	8	0	33	35	6%				
		Philadelphia	5	6	0	26	44	41%				
DEWBOT IV	2008	Hartford	2	6	0	51	62	18%				
		Philadelphia	6	5	0	18	44	59%	1	1	0	
DEWBOT V	2009	Annapolis	3	4	0	36	55	35%				Rockwell Innovation Award
DEWBOT VI	2010	Rochester	2	7	1	37	44	16%				
		Philadelphia	6	3	0	17	44	61%	2	2	0	Xerox Creativity Award

In addition:

- DEWBOT VI moved from the 805th-ranked team nationally at Rochester to the 85th place at Drexel.
- Highest qualifying rank ever
- First time selected for an Alliance
- First time in the semi-finals
- We received our 2nd Engineering Award
- First time we were viewed as a real contender by high-performance teams
- Phenomenal recovery from Rochester

What worked well

- Pit organized and with a defined process
- Pivot Drive overall performed very well
    - Maneuverable
    - Excellent vector control
    - Twist useful for clearing balls from walls & corners and for turning opponents
    - Excellent traction
    - Robust - Low maintenance
    - Long tread life
    - Stable over bumps - did not tip
- Overall the robot was robust and reliable, requiring very little maintenance
- CAD - designing before building and having the entire robot modeled in Inventor

- Proxy Chassis - a great workflow tool during the build season and a life-saver when we had to develop an improved possessor without the robot
- 5/8" coated Al rod (from KOP) held up as the Kicker Axle
- 1/2" steel rod performed well (much better than Al) as the possessor back roller
- Low or no penalties at Drexel (maybe 1)
- Bumpers - durable, easy to change & sharp-looking
- Stand location - when there wasn't a competition in-progress, the event video generally showed 1640's active cheering section (thanks, Amanda, Brianna, Jen & Julie)
- Shirts - distinctive - stands out in a crowd
- Screwdriver (although limited space at Drexel reduced exposure)
- We stood out from the crowd - Let's keep this up!
- Pre-event scouting was very good and useful
- welding (albeit 1 weld failed - without impact on robot performance)
- steel pop-rivets with backup-washers (for critical, permanent connections)
- Inspection - attention to details, attention to rules and thorough preparation pays off

What could have been better

- Autonomous performance
- Driver training is a weak point - More driver training is needed (for Carly too)
- Tactics were developed mostly on the competition field
- We need a back-up drive team
- One person kicks - more generally, operator responsibilities and roles need to be clear
- Wheel axle collars tend to loosen and shift
- Increase bolt penetration depth in next-generation pivots
- Increase pivot-tube securing set screw size from 8-32 to 10-32 or ¼-20
- Check wheel hub bolts for tightness (add to pit list)
- Install tensioners on steering chains
- Tread #4 wears out faster than others - wheel # 4 has the tensioner
- Kicker elastics replaced twice - once just before qualifying matches - next between qualifying and play-offs - both replacements were scheduled (bands did not actually fail)
- Side eye-bolts bend - cart or bump?
- Broke a battery box in the first practice match (with cut rather than drilled radii) - mounting modified for the 2nd box, which did not break
- Sponsor graphics not very visible - fix before PARC!
- Spare side guard bungies would be useful
- Event scouting information was unavailable - had we won our last qualifying match, we would have been selecting an alliance blind

- *Rochester happened* - fundamentally a team management problem which we cannot repeat (or forget)

Actions - Changes

- Our first priority is fund-raising - our coffers are empty
- Team 1640 is on a trajectory towards becoming a high-performance Team - continue to drive this!
- Proposal for 2011 - 2 Regional Competitions & Nationals
- Proposal for 2011 - the proxy chassis was great, but a 2nd robot would have been better. Most importantly, it would have allowed more driver training and better software testing.
- Don't wait to get to a Regional before developing tactics
- Extend cRIO panel lower
- Want Snake and/or Auto drive - or Absolute Crab with dynamic twist
- Want an aiming mode which twists about the ball (rather than wheelbase center)
- Want vision system aiming
- Driver training & selection on 2nd drive team candidates
- Better possessor with improved centering
- Don't leave site with field-team badges
- Want a flag (next year)
- Want robot hand-outs (next year)
- Buttons
- Powder Coating for next year's robot
- Replace Sponsor Graphics for improved visibility (before PARC)
- We will need real-time scouting for the off-season events
- Display Awards

Siri posted as discussion:

We placed 23rd of 55 (58%) at Chesapeake in 2005, though I can't find our W-L-T stats.
Did we run out of robot design handouts, or did you want something else? What happened with the buttons?
--Siri 21:50, 2 April 2010 (UTC)
Another thing that went well: inspection (three times!)
Suggestions for developing tactics:

- Watch the YouTube and CD posts (more people, more often), and watch the NASA webcasts if we're not in Week 1.
- Keep an eye or two on the FIRST forums, specifically for officials' tips (though not just driving--inspection, etc)

- Even if the robot can't make it, send the/one drive team to a good pre-ship scrimmage (preferably a powerhouse one). It'll help to see it played, even as a scrimmage, especially if we have a Week 1 Regional.
- Use the 5th Gear Sim?

Other possible changes:

- Bring the vice *inside* the building (to the pit, even). Also scrap wood and extra chain tensioners, if they're not already in the kit.
- If pivot 4 is still having a problem, do we want to add checking chain tension to the pit list? (can't hurt) I thought the tread wore out because the collar was loose.
- Figure out a more efficient way to switch plaction treads (i.e. not stapling)?
- (Next year) Accurately record any dimension differences between the competition robot and the workflow tools/second robot.

Other to-dos:

- Fundraising: 1511 and 103, among others, have this down to a T (or G or whatever it is), if we're looking for good starting-point examples (which we should). 103's site is less helpful, but they'll answer almost any question you can come up with (Championship Chairman's winners). CD's good too, of course.
- Set up CAD collaboration network (103's good for this too)
- Teach CAD team .dwg to .dxf converting and BoM function
- Have *students* think about Chairman's and WFA...before the first Saturday in January.
- Network! People recognize us for good reasons now, let's build off that.

--Siri 00:33, 3 April 2010 (UTC)

Clem McKown