

2056



OP Robotics Team **2056** Keys to Success



Who am I?



Tyler Holtzman

Lead Design Mentor 07-Present

1114 Alumnus 03-07

Senior Design Engineer – Volm Companies

2010 Woodie Flowers Finalist Award Winner



2056 Ways
to win



How to Win ~~23~~ 2 Consecutive Regionals?



2056 Ways
to win



Outline

1. Goal Setting
2. Build Schedule
3. Decision Making
4. Design Methodology
5. Fabrication & Assembly



Goal Setting



Set goals for everything!

- Season
- Event
- Week of build
- Day of build

Start big, work your way down.



Goal Setting



“Focus on the little things, and the big things take care of themselves.”



Build Schedule



Build Season Official Team Meetings
Monday, Wednesday, Friday 2:30 –
9:30

Saturday 9 – 6
30 Official hrs weekly

Behind the Scenes, additional 20+ hrs



Build Schedule



Competition Season

Practices everyday

Lunch time $\frac{1}{2}$ hr

After school $\frac{1}{2}$ - 2 hrs

Design revisions as needed



Build Schedule



Disclaimer: Find a schedule
that works for your team.

YMMV



Week 1



Saturday Kickoff Meeting

- **Completely Read and understand rules**
- Establish design Constrains, Scoring Challenges
- Order Game elements

Monday Team Brainstorming Meeting

- **Examine Scoring**
- Identify what tasks the robot will need to do
- Identify trade-offs if necessary
- Some years doing everything is necessary, other years its not possible.
- Decide on Drive base and order components if possible. If this decision is anything other than 6 or 8 wheel tank drive, you'd better have a good reason.
- Begin Detailed CAD Design of Drive base



Week 1



Wednesday Team Meeting

- **Continue Brainstorming**
- Decide on upper mechanism layout
- Prototype as necessary
- Continue Detailed CAD Design
- Order more components as design firms up

Friday Team Brainstorming Meeting

- **Finalize Conceptual design of robot**
- Prototype as necessary
- Continue Detailed CAD Design
- Order more components as design firms up

Saturday Team Meeting

- **Build the Field**
- Prototype as necessary
- **CAD, CAD, CAD**



Week 2



Monday, Wednesday, Friday

- **CAD, CAD, CAD**
- Prototype as necessary
- Begin in-house fabrication of drive base components
- Order outstanding required raw materials (sheet, tube, bar)

Saturday Team Meeting

- **Finalize CAD Drawings for release to outside fabrication**



Week 4



Monday

- **Complete mechanical assembly of practice robot**
- **identify any areas of concern or possible rework**
- Begin wiring of practice robot
- in house fabrication of all outstanding components

Wednesday

- **Complete wiring of practice robot**
- Continue software integration and automation
- practice robot mechanical testing
- in house fabrication of all outstanding components

Friday

- in house fabrication of all outstanding components
- **design revisions as necessary**

Saturday

- **Finalize design prior to competition robot assembly**



Week 5



Monday - Wednesday – Friday - Saturday

- **Competition robot assembly**
- software integration and automation
- Practice robot functional testing



Week 6



Monday

- **Competition robot assembly Complete**
- Continue software integration and automation
- Autonomous mode

Wednesday – Friday – Saturday

- **Buffer for unexpected delays**
- Competition robot Shakedown
- Continue software integration and automation
- Autonomous mode



Week 6+



Monday (Family Day) Team Meeting

- **Competition Robot Shakedown**
- **Autonomous mode**
- **Official Driver Practice Begins**

Tuesday Team Meeting

- Competition robot Shakedown
- Bolt Check
- **Bag Robot**



Competition Season



- Bag Day – Sat Champs
- Daily driver Practice 1 – 2 ½ hrs
- Practice robot maintenance
- Practice robot Programming
- Watch other events
- Look for areas to improve
- Constant Iteration



Schedule



Questions on build Schedule?



Decision Making



- Make decisions early! More time to regret them later!
- Heavily CAD Driven
- Rely on Experience
- Learn from others (CD, RI3D, Build Blitz)



Decision Making



- Consensus vs Voting
- Know your limits. Design within them.
- Don't do everything!



Design Methodology



- Simple, Simple, Simple
- Robust
- Fewer parts, less design time, less fabrication time, less things to go wrong
- Avoid doing everything!



Design Methodology



- Design according to your resources
- Buy everything you can. Make only what you can't... and are capable of.
- Order Parts Early
- Finish Early, iterate



Design Methodology



- CAD Everything
- Or not, remember your resources



Decision Making & Design Methodology



- Design & Decisions Making Questions?



Fabrication



- Build to your resources!
- Know your schedule, be conservative



Assembly



- Practice Robots should be identical
- Take the time to fit your parts nicely
- Standardize Fasteners, Pneumatic fittings, electrical connectors, solenoid valves



AMA



- Final Questions?

