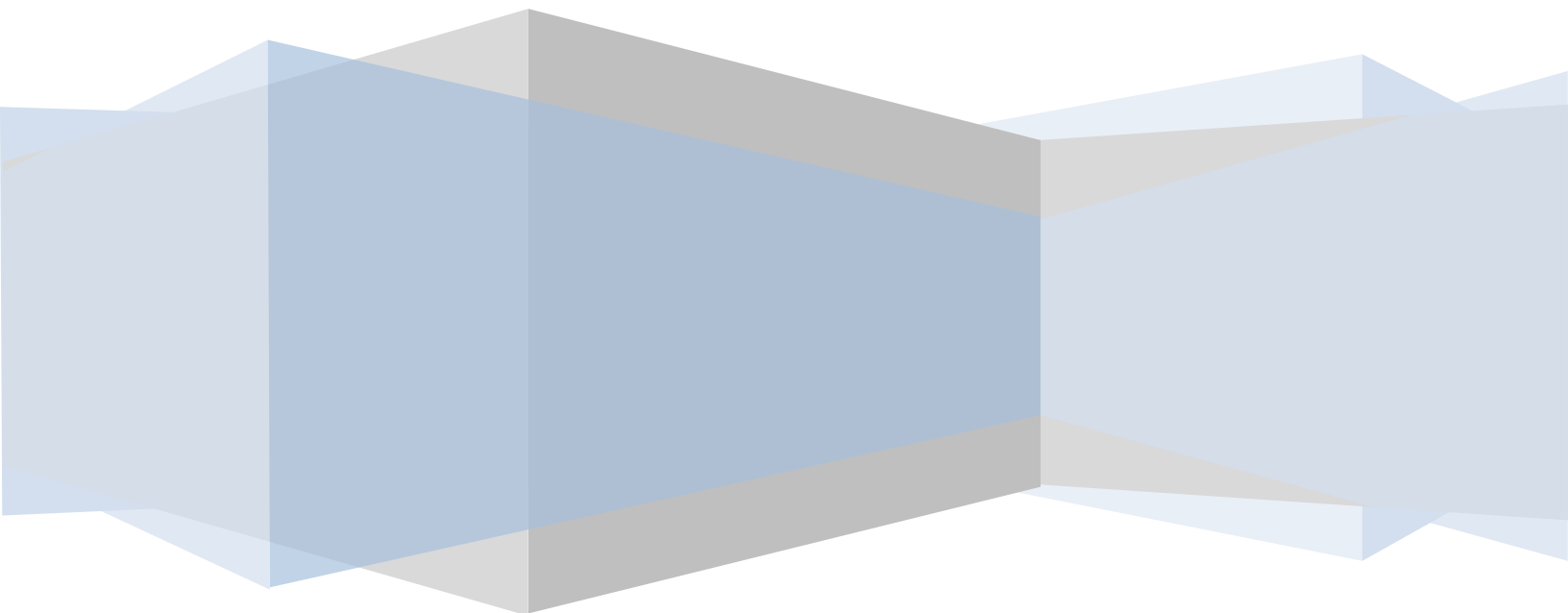


Rick Hansen Robotics Team



# Robot Playbook



## Revision Block

Revision Level	Changes Made	Date Revised	Revised By
1	Initial Draft	Nov 25, 2015	Thuvishan R.
1.1	Added Revision Block	Dec 12, 2015	Malavya S.
1.2	Updated to Include Mentor / Student Input	Jan 5, 2015	Thuvishan R.
1.3	Updated to include Mentor feedback for 2017 season	Oct 17, 2016	Malavya S.
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## 1.0 Introduction

The purpose of this document is to provide an overall understanding of the Rick Hansen Robotics Design Process to design and build a robot competing in the FIRST Robotics Competition (FRC). This document highlights all of the important steps to be taken, gives a suggested timeline to complete these steps and provides guidance on how each of these steps should be carried out.

In each part of the design process, there are several Best Practices that have been developed by the teams through years of experience. Some of these best practices have been highlighted throughout this document.

This document is to be used during the Build Season as a guide on how the Robot should be designed or built. However, this document is simply a supplement to all other documents that may contain any technical information that may be required to design and build the robot itself. This document does not replace any reference documents, tutorials or workshops that may still be required to design and build an FRC Robot.

## 2.0 Kickoff Weekend

FRC releases the game or object of the competition for that year usually on the first Saturday of January. This event is known as Kickoff. This involves watching a video that FRC releases depicting how the game for that year is to be played. FRC also releases several related documents such as the Game Manual. These documents give the participating teams an idea of the rules and regulations pertaining to the Field, Game and Robot. Adhering to these rules and regulations helps the team understand the game and build a robot that complies with these rules.

The purpose of the Kickoff Weekend is to thoroughly analyze the game and try to visualize how the team's robot will navigate on the field and perform all the tasks that the team agrees to. The team will also start brainstorming some preliminary design ideas for the robot and agree on which ideas to prototype in the coming week.

## **2.1 Kickoff Weekend Outline (Jan 7 – 8)**

### **2.1.1 Saturday – Kickoff and Strategy Meeting Objectives**

On Kickoff Saturday the following are the objectives for the team:

1. Read all Game documents and thoroughly analyze and understand the objectives of the game.
2. List all possible Autonomous and Tele-operated Strategies. Hypothesize reasonable strategies for both teams.
3. List all possible robot movements required to achieve the above discussed strategies.
4. Determine which robot movements are absolutely required by the robot design.

### **2.1.2 Saturday Must Do's**

Here are the tips and tricks for Saturday:

1. Try and keep everyone focused on the task at hand and stick to the allotted time.
2. While selecting feasible strategies for each team, stick to the simplest possible method of achieving that strategy.
3. Try to incorporate human intervention as much as possible while selecting feasible strategies.
4. Everyone must understand and agree on the selected role to play by the end of Saturday.
5. While selecting requirements, make sure that they are easy to design and do not require too many additional subsystems to be made. The ideal number of subsystems is 4: Drivetrain, Intake, Tool and Endgame.
6. Have Chart Paper ready with a pre-determined template so that the notes are organized and can be compiled more easily.
7. Obtain permits on Kick-Off weekend for both Saturday and Sunday in order to have efficient workspace.

### 2.1.3 Saturday - Kickoff and Strategy Meeting Schedule

8:30 am	Some Students/Mentors from all teams meet at Ontario Science Center or Quick-build
9:30 am	Students meet at Rick Hansen Secondary School to watch Kickoff
12:00 - 12:45 am	Lunch
12:00 - 12:45 pm	Obtain Kit of Parts and head to Rick Hansen Secondary School and Start Reading Manual – this may be delayed if the Science Center presentation is extended.
12:45 - 2:15 pm	Inventory of both kits (1241 & 1285)
12:45 - 2:15 pm	Divide into 5 groups (Leads: TBD) <ul style="list-style-type: none"><li>● Read Game Manual (this will start earlier as well, right after kickoff)<ul style="list-style-type: none"><li>○ If possible, print of multiple copies of the Game Manual</li><li>○ Read Game, Tournament, Robot and Arena sections OUT LOUD</li><li>○ Create a summary sheet of all the key rules for this year’s game as a quick reference</li><li>○ Every rule should be read and understood by all members present</li><li>○ Any questions should be listed to be asked in the Q/A</li></ul></li></ul>
2:15 - 2:30 pm	Break
2:30 - 4:00 pm	<ul style="list-style-type: none"><li>● <b>Detailed Scoring Analysis &amp; Strategy (Lead Students/Drive Team)</b><ul style="list-style-type: none"><li>○ <b>Autonomous Mode:</b><ul style="list-style-type: none"><li>● Note Autonomous time limit</li><li>● Note if human intervention is allowed (Hybrid Mode)</li><li>● Note starting position of robot</li><li>● Note the number of game pieces and their starting positions</li><li>● Make an autonomous scoring chart</li><li>● List ALL possible autonomous routes possible</li><li>● Rank ALL possible autonomous routes from easiest to most difficult (prioritize which routes you absolutely need vs. which you like to have)</li><li>● Determine maximum autonomous scoring possible within time limit</li></ul></li><li>○ <b>Tele-operated Mode:</b><ul style="list-style-type: none"><li>● Note Tele-Operated Mode time limit (minus end game)</li><li>● Make a Tele-Operated scoring chart<ul style="list-style-type: none"><li>○ List scoring scheme</li><li>○ List ALL penalties and associated points</li></ul></li></ul></li></ul></li></ul>

- Scoring Analysis:
  - List theoretical maximum score during Tele-Operated mode
  - List reasonable score during Tele-Operated mode
  - List any special scoring circumstances or scenarios (do game pieces de-scored/stuck still count)
- List any conditions that affect seating position (does difficulty of match matter?)
- Robot Movements:
  - List ALL robot movements possible
  - Rank ALL robot movements in terms of priorities.
  - List ALL combinational activities (more than one movement at a time)
  - List ALL defensive strategies
  - List ALL ways you can make the opponent commit penalties
- **End-Game:**
  - List time when end-game scenario should be initiated
  - Make end game scoring Chart
  - List maximum score possible (qualifying and elimination rounds)
  - List any conditions that help with seeding position

4:00 - 5:00 pm

**Requirements/Preferences (MUST BE COMPLETED):**

The goal of this portion is to clearly outline:

- All required goals for the robot, and preferred goals.
- List must be approved and checked by lead students and mentors

8:00 pm

Update People from Quick Build

- Show required/preferred list, and Game strategy for Autonomous, Tele-op, and Endgame.
- Preliminary drive-base configuration discussion (as much as possible)

Requirements get split up into the following categories:

- Intake/Game Piece Possession, Tool, Drive Train, Endgame

## 2.2 Kickoff Sunday Brainstorming Objectives

### 2.2.1 Sunday Design Objectives & Must Do's

Here are the trips and tricks for Sunday:

1. Try and keep everyone focused on the task at hand and stick to the allotted time.
2. Refine Drivetrain design
3. Take the concept chosen in brainstorming session and start deciding key parameters, materials and shapes for each of the parts for prototypes
4. Perform preliminary engineering calculations
5. Start developing basic 2D and 3D CAD models of prototypes
6. 1285 must complete their parametric study/ prototype design for intake/game piece possession category
7. Ensure any task / objective that requires obtaining a game piece is touch and go. (meaning it should be motor driven and either be in taken over the bumpers or through an opening in the chassis)
8. While selecting requirements, make sure that they are easy to design do not require too many additional subsystems to be made. Ideal number subsystems is 4: Drivetrain, Intake, Tool and Endgame.

### 2.2.2 Sunday - Brainstorming Session

9:00 - 9:45 am      Students/Mentors meet at location for discussing strategy/requirements list created on previous night.

- List MUST be finalized and agreed upon by all lead students and mentors, this determines how robot design discussions take place today.

9:45 - 10:30 am      Introduce Mentors/Leads from each section

Play Kickoff Video

All the decisions from Saturday get presented

The following will be presented:

- Autonomous Strategy
- Tele-Operated Strategy
- End Game Strategy

15 Minutes at the end of this meeting will be spent playing around with the game pieces to get a feel for the objects.



10:30 - 12:30 am	<p>Students/mentors are split into their respective teams (1241 &amp; 1285) to discuss intake, tool and end game design. Drivetrain discussion can be optional depending on game field. All team members are encouraged to participate and provide ideas.</p> <ul style="list-style-type: none"> <li>● 20 - 30 minutes is allocated per category for both brainstorming and discussion.</li> </ul> <p>Every member should present their ideas, and responses would be recorded as part of a complete list.</p>
12:30 - 1:00 pm	Lunch
1:00 - 2:30 pm	<p>Mentors/lead students will discuss the presented designs for each category. The student group will rank each design by listing the advantages and disadvantages for each design. <b>(45 Minutes)</b></p> <ul style="list-style-type: none"> <li>● Obvious choices should be eliminated quickly, and if decision between 2 designs is not made, both designs may move on to prototyping phase. <b>(45 Minutes)</b></li> </ul>
2:30 - 4:00 pm	<p>Detailed decisions and plan of action for week 1 must be completed (deciding on Prototype CAD model completion date, and prototype build/testing days)</p> <ul style="list-style-type: none"> <li>● Each category prototype will have a set of variables to be tested, while also making sure requirements can be met.</li> </ul>
4:00 – 5:00 pm	<p>Mentors Meeting/Drivetrain detailed design</p> <ul style="list-style-type: none"> <li>● Discuss build schedule and availability of mentors</li> <li>● Create detailed design for drivetrain for all parameters including wheel configuration, gearbox, and overall size</li> </ul>
5:00 – 7:00 pm	<ul style="list-style-type: none"> <li>● Everyone leaves the school, lead mentors &amp; key lead students head out to start work on parametric studies/Physics Models/CAD models are to be started for each prototype. These prototypes must include detailed information/flexibility in order to test all variables</li> </ul> <p>Parametrics: outline every position on the field that robot will be in (including bumpers)</p>

## 3.0 Week 1 Prototyping

- Prototyping is when the initial designs are tested for effectiveness and feasibility in real life
- Making an effective plan on what to prototype is crucial so that you can go in knowing what actually needs to be prototyped and not waste time on prototyping every possible idea.
- Make sure to prototype possible variables that can only be tested to avoid doing them in the design phase. Make a list of these variables before beginning prototyping so the goals are clear
  - i.e. pinch, force of puncher, strength of catapult

### 3.1.1 Week 1 Objectives

## 3.2 Prototyping Week 1 Monday – Tuesday (Jan 9 – 10)

- **NO MANUFACTURING / BUILDING OF ANY PROTOTYPES ON THESE TWO DAYS**
- Continuous CAD design of prototypes for systems decided.
- Prototype must be powered and include critical sensors. It should also reflect the final design intent. Wood is preferred, but metal can be used if needed.
- Test process for prototype must also be created, and reflective of questions to be answered.
- Tuesday: for any subsystems requiring multiple prototypes (catapult vs wheeled shooter), only one will be built during next few days. **All other prototypes will be eliminated.**

### 3.2.1 Prototyping Week 1 Wednesday – Friday (Jan 11 – 13)

- Design team will be paired with mechanical students to build prototypes based on designs created and decided upon on Tuesday.
- Continue to question all the variables to be tested, and also keep in mind amount of mechanical components required. Keep note of any components that would change significantly on final design (linear sliders vs bearings)
- Testing spreadsheet should be developed. Criteria matrix for configuration choice should be made (2-wheel vs 4-wheel intake etc.) **(Mentor in Charge)**
- **Goals:**
  - Modular design, determine exact geometry of what the final CAD can be.
  - Determining where the system is powered from and how, be it motor powered or passive. (Coil springs / Gas struts)
  - Mounting positions
  - Prototype MUST REFLECT what the final design will be. Power system should be identical, **MAJOR CHANGE IS NOT ALLOWED**
  - END OF FRIDAY ALL PROTOTYPES SHOULD BE BUILT WITH ROBUSTNESS AND QUALITY TO ENSURE NEAR REPLICATION ONTO THE COMPETITION ROBOT
  - Videos of successful prototypes' testing should be recorded, saved/archived and sent to reveal video team

### 3.2.2 Prototyping /Integration Week 1 Saturday – Sunday (Jan 14 – 15)

- *Saturday Morning*: Continued testing and refinement of the prototypes in order to improve their performance.
- *Saturday Afternoon*: Physical integration of prototypes and obtaining an overall picture of the final robot design. If possible, all prototypes should be mounted onto a chassis in order to see how game piece interaction takes place between mechanisms.
- *Sunday Morning*: Continued integration of prototypes.
  - Questions for dimensions and problems during actual design should be answered.
    - Integration / interference issues
  - Capabilities and room for improvement should be outlined.
    - Reestablish strategic requirements and ensure we have met them.
  - Determine parts to be ordered.
  - *Sunday Afternoon*: Final Robot design starts. If possible, have at least 3 - 4 hours of design work completed before this day ends.
  - Drivetrain design should be completed by this time in order to start manufacturing on Monday.
  - Videos of integrated prototype should be recorded, saved/archived and sent to reveal video team

### 3.2.3 Preliminary Code/Controls Week 1 Saturday – Week 3 Tuesday (Jan 14 – 24)

- As final robot design starts, determine what sensors should be used for a specific system on the robot.
- Once the final design has been chosen it is time to start writing pseudocode for how the robot is going to work, and how autonomous is going to work.
  - Class diagrams should be used to setup templates for various subsystems on the robot. Each diagram should clearly show general descriptions of methods and variables. While using arrows to connect diagrams together to show how a class interacts with one another.
  - A built partial field is an excellent way to envision the autonomous in relation to the field.
- Working with the design team to integrate sensors and other controls components in can also be very useful as integration will be part of design and not an after-thought.
- Once motors, pneumatics, and any other components that are needed to make the robot work are finalized, base code programming may start.
- This will make it possible to have most of the code ready once the robot is built and all that needs to be done is to add on or modify the base code for Tele-op.

Keep most complex system intact with sensors so programming people can play.

## 4.0 CAD and Design

### 4.1 Week 1 Sunday – Week 2 Thursday (Jan 15 – 19)

- One week of CAD and design is crucial for a guarantee to have a successful robot
- CAD design should be completed by Thursday of this week, in order to leave Friday/Saturday for drawings.
- Midweek review will take place on Wednesday in order to reflect on any major problems, interference issues, or any conceptual questions. This review will also take place on Saturday while drawings are being created. **(3 Mentors)**
- Updates on Facebook must be created every day, including pictures in the build blog.
- Order for parts should be placed on Thursday in order to ship Friday, if it cannot be completed then Sunday evening, parts will be ordered.
- Begin reveal video story boarding process and brainstorming
- Review footage as of week 1.5

### 4.2 Week 2 Friday – Week 2 Saturday (Jan 20 – 21)

- If Friday needs to be a late night to meet the Saturday deadline, then designers must stay late, or at someone's house. Design will be locked on Saturday.
- Aesthetics, Lexan, sponsor displays must all be completed as well.
- Updates on Facebook must be created every day, including pictures in the build blog.

### 4.3 Week 2 Sunday – Final Design Review (Jan 22)

- Final design review will take place on Sunday Morning, with a design presentation created by the team. All major stakeholders including sponsors will be invited to this presentation.
- **Goals:**
  - Organization of parts within the classroom needs to be completed
  - Zones with totes for drawing locations/zip lock bags/zip ties should be allocated
  - Order for manufacturing parts with timelines should be determined
  - Determine allocation of CNC between 1241 and 1285 throughout the next two weeks.
  - Complete order list for parts and materials should be ordered before leaving.  
Each subgroup needs to make their own full order list, to be approved by eng. lead.
  - DXFs of the cad for CNC machining need to be done.
  - MAKE THE FIELD ELEMENTS REALISTIC INCLUDING SPRINGS.
  - ANY JIGS for manufacturing need to be designed, especially to hold complex pieces like sprockets or gears and extrusion for lightening.
  - Finalize story boarding and items to be recorded.

### 4.3.1 Design Tips and Tricks

- Follow team standards when it comes to:
  - 3 thou added to center to center distance for belts
  - 12 thou added to center to center distance for chain
  - 3 thou added to center to center for gears to ensure proper meshing
  - Retaining Ring Groove ½" Shaft: 0.468" DIA, or 0.016" depth, 0.040" width, outer edge of groove placed 0.060" from shaft end face
  - Round hex shaft end face to allow for easy access to retaining clips
  - Bearing blocks should have clearance fit into mounting holes on chassis
  - Most common bolt used should be 10/24 – socket head cap screws.
  - Bearing holes are to be 0.125" diameter with a new cutter \*to be tested
- Design for 100lbs, exceptions would be at the discretion of the lead design team.
- Design the simplest solution that achieves all desired tasks in fastest way possible.
- Decide on and control the LEAST amount of variables to accomplish the given task. (E.g. shooting games. Shot positions, Hood Angle, Angular Velocity).
- Objects that only need to be orientated in two positions, then use pneumatics. (E.g. up righting containers)
- Sensor feedback at every joint of a linkage system, shooters require rotational speed to be tracked. Use optical sensors for high speed shooters.
- Take away as much load from the motor by using gas struts / coil springs when lifting heavy objects.
- Intakes should spin faster than your drive train in order to grab objects while moving backwards and forwards.
- Never use pliable plastic for gearbox plates. They tend to separate gears over time.
- Uniqueness is insignificant, being the fastest even if similar to others is more important.
- Design for possible flaws in field elements that may affect your robot's performance. Only for the specified field tolerances detailed in the manual however.
- When designing with pneumatics, always design for further actuation if the mechanism is going to compress against a solid object.
- Always check for interference with mounting and other hardware in CAD before manufacturing. Such things are easy to miss including interference with nuts or pneumatics fittings.
- Surgical tubing/elastic bands have an exponential wear over time. Be wary when designing and using them. Coil springs are a more consistent solution.
- Have external eyes critique your design so that you minimize risk of failure.
- Check all geometry in CAD through parametric studies before starting to 3D model
- Poly Cord isn't ideal compared to V belts or timing belts when trying to move objects through the robot. Belts should not be used to funnel objects.
- Drive gearbox plates should have independent motor mounting holes while having proper clearances to access all the screws to allow for ease of maintenance.
- When designing mounting holes, consider assembly process. (Rivet holes in a corner).
- Design a proper center to center spacing for sprockets to allow for an even number of links.

- When using pneumatics extension of cylinder provides more force when compared to retracting due to surface area available within the cylinder.
- When designing an elevator carriage, bearings should be on the outside edges of the extrusion and not riding on the center of the tower.
- Do NOT use nylon strap for cable routing on pulleys for elevators.
- #35 Chain > 15mm Belts > #25 Chain for drivetrain. #35 chain for pneumatic wheels or wheels above 6" diameter is highly recommended. Due to the intense play for district system, we will be choosing #35 chain for drive for durability purposes.
- Figure out degrees of freedom required to control for bracing (x, y, z. Ex: Elevator carriage riding up and down slider.)

## 5.0 Manufacturing Week 3 Monday – Week 4 Sunday (Jan 23 – Feb 5)

- Manufacturing starts as soon as design is finalized in CAD to avoid any errors
- If portions of design are completed earlier than foreseen, then those subsystems may begin the manufacturing process ahead of time. Manufacturing must prioritize the build schedule based on the schedule created on Sunday.
- All manufactured parts must stay organized and accounted for. In plastic bags along with the working copy of the technical drawing
- As for CNC parts, DXFs must be made from the 3D model to be manufactured

### 5.1.1 Manufacturing Must Do's

- Whenever possible, limit the amount of lightening holes on the drive train to simplify the manufacturing process
- Prioritize the order of which components are made. First ensure that all efforts are focusing around building two of each part, starting with gearboxes, drive train, intake, tool and then endgame.
- When considering lightening holes, circles are quicker and more efficient than any other pattern (i.e. triangles/iso-grid/hex angles)
- When large amounts of stress aren't being applied to the belly pan, it's ok to go with a polycarbonate plate as long as it's properly supported preventing sag. Aluminum corner gussets must be on bottom of chassis as well as top for strength purposes.
- Having students in charge of documenting the Prototyping/Design/Build and testing of the robot is critical in engaging the entire team.
- Organize parts ready to be assembled with a designated part drawing, with small parts placed in zip lock bags.
- Each part drawing should be printed twice, one is placed in the design binder the other attached with the part to be manufactured.
- Drawings for some CNC parts may be necessary if small differences are not easily spotted (i.e. different spacing for mounting holes).
- Bumper material on practice bot must be the same as the real robot.
- Record footage of parts being manufactured and team members of all subgroups at work
- Regroup, organize and review media, as well as assigned tasks to reveal video team.

## 6.0 Assembly and Testing Week 3 Thursday – Week 5 Tuesday (Feb 2 – 7)

- Make sure all the parts are laid out before the start of assembly.
- Ensure that the designer is present and reference the CAD to ensure the proper order when assembling components
- Ensure squares, alignment tools, c-clamps are used to properly assemble and align components when assembling.
- Measure all parts before assembling. If not correct- remanufacture. (E.g. standoffs shouldn't be bigger or smaller than designed size). **HAVE A NEW QUALITY CONTROL PERSON TO CHECK PARTS.**
- Notice any problems with assembly methods (Clearance issues/Interference issues)
- If any issues are present from CNCing parts, talk to Mr. Lehman. (Gearbox plates not cut identically/ bearing holes undersize)
- Record pictures and footage of assembly (time lapse if resources available)
- Finalize storyboard
- Begin selecting, editing and compiling media as per storyboard

## 7.0 Electrical Week 4 Sunday – Week 5 Wednesday (Feb 5 – 8)

- The wiring and controls of the robot starts as soon as the drivetrain is complete. This must be done quickly as nothing else can be assembled until the full robot is wired.
- RoboRIO must be insulated from any metal to avoid any shorting issues.
- Make sure to wire everything as neatly as possible as it makes it much easier to trace problems or issues.
- Create a map showing which components are wired together and to which ports.
- Label wires at each end to make troubleshooting easier.
- 12 AWG wires should be used for CIMs and mini CIMs.
- 16 AWG wires should be used for bag motors or motors with similar current draw.
- 18 AWG wires should be used for providing power to roboRIO, PCM, VRM and other electrical components.
- All wire ends of PWMs and like connections should be covered with heat shrink to ensure wires will not break at the housings.
- Try to avoid soldering wires that will be used for high load applications, every bit of resistance can affect performance.
- **ROUTER NEEDS TO BE MOUNTED HIGHEST POINT ON ROBOT IF POSSIBLE**
- Record pictures and footage of electrical wiring, lights, etc. (short time lapse if resources available)
- Continue selecting, editing and compiling media.

## 8.0 Iterations Week 5 Thursday – Sunday (Feb 9 – 12)

- You will always need to iterate designs throughout the season
- Feasible solutions MUST be completed by week 5 Sunday; the iterations shouldn't go past the set date.
- At this point, the competition bot should be finished in terms of manufacturing, and practice bot should be well on its way towards competition.
- WEIGHT REDUCTIONS, LIFE CYCLE TESTING, TELE OP TESTING are all forms of Iteration Practices
- Record practice bot footage (parts of story board that fit) as backup
- Regroup, organize and review project file as well as remaining tasks for reveal video team.

## 9.0 Final Coding Week 5 Friday to Week 6 Wednesday (Feb 10 – 15)

- Now that the practice robot is fully complete, the code for tele-op can be polished or modified with the real robot.
- Real robot must be completed by this time as well so that there is no delay in terms of transitioning from competition robot to practice robot.

### 9.1.1 Controls Tips and Tricks

- Must incorporate sensors into prototypes during prototyping phase.
- Ensure electronics design is overlapped within design. (e.g. routing holes within extrusion to ensure clean wiring)
- Prioritize Autonomous routines on the actual competition bot over practice.
- Pseudo code should be generated after initial meeting where overall robot design is decided
- Record robot photoshoot (TBD)

## 10.0 Autonomous and Practice Week 6 Monday – Sunday (Feb 13 – 19)

- TBD Later in season
- AUTO requires proper field for exact distances (prioritize for Monday)
- Thursday and Friday is dedicated for Autonomous routine for real robot
- Saturday and Sunday is dedicated for driver practice for real robot
- Prioritize practicing with other teams in order to get a better understanding of the game
- Record comprehensive robot practice footage (stabilize pan shots, aerial drone shots if possible). Also record specific autonomous routines.



## 11.0 Preparation for Competition (Feb 20 – 21)

- Design binder, posters, decals, bumpers
- Train pit crew, scouting crew
- Practice driving
- Reveal the practice robot/real robot
- Finish reveal video
- Finalize remaining edits, tweaks and modifications for video. Upload to YouTube.

## 12.0 Competition Season

- Back to back regionals/district events are ok unless they are at the beginning of the season. Do NOT sign up for 3 in a row.
- Ensure a pit check list has been created and roles have been outlined for students.
- Ensure all items are packed and ready to go as per checklist, the night before the departure date as to ensure a smooth transition.
- Outline and implement a cross talk plan to improve communication throughout the season.
- Organize all roles for mentors and students the weekend before attending the event.
- Do system checks after every match for the mechanism you are responsible for.
- Create a mentor buddy plan so that mentors are responsible for ensuring students leave/arrive and eat at the venue.
- Organize food and rides for the venue up to a week in advance of the actual competition to minimize confusion.
- Ensure full team's roster with consent forms have been signed and submitted along with bag and tag lockout form.
- Thursdays of competition should also include helping teams getting ready for matches in order to elevate the competition and sure everyone is ready to go come Friday morning.
- Coaches during competition and off-season must be a mentor.
- Dean's List nominees must be prepared for their interview 1 week prior to their regional event.