

**FIRST Robotics
Team 203 Safety
2019**

Hello!

My name is Connor Leiser

I am Team 203's Safety Captain for 2019. My goal is to keep people safe on and off the playing field, which is a large part of the FIRST Robotics Competition. This presentation will cover the basics for **safety** while building, driving, and maintaining robots in FIRST.



1. Personal Protective Equipment (PPE)

Face/Eye Protection

- Safety glasses have to be either,
 - ANSI Approved.
 - UL Listed.
 - CSA Rated.
 - Non Shaded.
- If you wear glasses, you need a pair that fits over your glasses.
- Always wear eye protection when,
 - Doing any work on a robot that requires power tools.
 - There is a risk of airborne particles or chemical exposure.
 - In a pit station at a FIRST Event.
 - ▣ Eye protection is always available at FIRST Events.
 - On a playing or practice field.
 - Anywhere a sign instructing eye protection is posted.



Other Protection

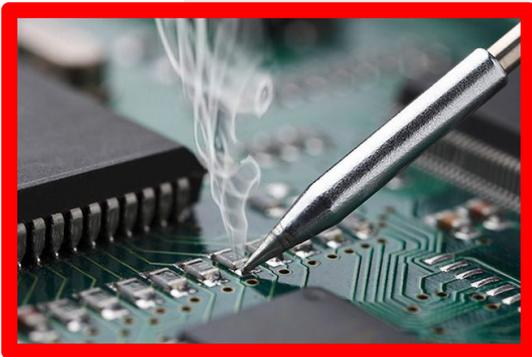
- Utilise safety guards on power tools when possible.
- Report if a power tool or piece of equipment seems damaged or broken.
 - Don't use broken or damaged equipment.
- Wear earplugs or other sound-cancelling equipment when necessary.
- Remove or properly cover loose or hanging clothing (ties, sleeves, etc.) and tie up long hair.



2. Proper Use of Tools

Soldering

- Use lead free solder and heat it electrically, to avoid overly toxic fumes.
 - Only solder with access to good ventilation.
- No torches or open flames are allowed.
 - Except when specified.
- Do not touch the soldering iron or the gun or leave them where they may be touched.
 - Put the iron in its holder when it's not being used.
- Work on fire resistant surfaces.
- Wash your hands when done.



Hand Tools



- Only use tools for their specified tasks.
 - I.E. only use a screwdriver to implement screws.
- Only use tools that are in usable condition.
 - Check tools for damage or wear and report any damaged or worn tools.
- When using sharp tools, point them away from yourself.
 - When not in use, cover sharp edges of tools.
- Don't store tools where they could fall and hit someone

3. Batteries, Electricity, and Chemicals

Stored Energy



- It's important that you de-energize your robot before working on it.
 - Don't work on an energized robot unless absolutely necessary.
- Electrical:
 - Disconnect the power source.
 - Open circuit breaker and unplug batteries.
- Pneumatic:
 - Vent compressed air until the pressure gauges read zero.
- Miscellaneous:
 - Disperse elastic energy by releasing springs and stretched rubber.
 - Reset all motorized components into their default positions to avoid the risk of them resetting while being worked on.



Battery Warning

FIRST batteries contain Sulfuric Acid (H_2SO_4), which will burn skin, eyes, and clothes. This odorless, colorless chemical is very dangerous and therefore a MSDS (Material Safety Data Sheet) will be provided.

Batteries - Damage

- Damaged batteries are dangerous and therefore unusable.
 - Batteries could explode due to short circuiting.
- If a battery is damaged, you must,
 - Flush all contacted skin immediately.
 - Seek medical attention.
 - Regularly inspect batteries for damage.
 - Cracks may not be visible, but will still leak.
 - Treat it as hazardous and deal with it according to the MSDS.
 - Don't use damaged batteries.



Batteries - Materials

- There are a few materials that should be kept in case batteries are damaged.
- Sodium Bicarbonate,
 - Used to neutralize Sulfuric acid in the event of battery leaks.
- Acid-resistant gloves,
 - Used to safely handle a leaking battery.
- Nonmetal leak-proof container,
 - Place defective batteries in it.



Batteries - Procedure In Case of a Leak

1. Neutralize the acid with Sodium Bicarbonate, then dispose of the now safe residue with water.
2. Follow MSDS regulations of handling.
 - a. Inform an advisor.
3. Put on gloves to prevent chemical burns.
4. Put the battery in a leak-proof container.
5. Neutralize all acid on the gloves before disposing of them or putting them away.
6. Seek medical attention if any skin came into contact with the acids.
7. Properly dispose of the battery in accordance to state laws and MSDS regulations.
 - a. Most automotive retailers or manufacturers will accept damaged batteries with no cost.



Batteries - Handling



- Keep the charging area in order, so as not to lose batteries or place them in unsafe conditions.
 - Keep proper ventilation in these areas.
- Don't short out the batteries, as they may explode or catch fire.
- Don't charge batteries faster or for longer than recommended.
 - This may weaken the battery life or cause them to heat up.
- Inspect a battery for cracks and bent terminals before and after each match.
 - Bent terminals could cause an acid leak.

Chemical Safety



- Keep all containers in good condition, including the labels.
 - Make sure that labels are readable, preferably typed.
- Familiarize yourself with common chemicals, including safety procedures.
- Store chemicals where they can easily be categorized and accessed.
 - Along with their MSDSs.
- Flammable materials are off limits at FIRST events.

Respect of Electricity

- Inspect all cables and wires on your equipment to make sure they are in working order.
- Don't overload electrical sockets, fixtures, or receptors.
- Don't create chains of power strips.
 - Often referred to as "Daisy Chaining."
- In addition, avoid electrical overloading by avoiding,
 - Chains of extension cords
 - Plugging extension cords into power strips.
 - Plugging combination outlet strips into power strips or extension cords



4. Safety at FIRST Events

Basic Rules

- Safety glasses must be worn in the pit at all times.
 - They are used to gain entry.
- Make sure to have safety glasses on your person for easy access.
- Lift objects in a safe manner.
 - [Link to a PDF for safe lifting techniques.](#)



Setting Up A Team Station

- Use work gloves for setting up and packing up your pit station.
- Follow all safety procedures and use proper tools.
 - Use ladders to gain height when setting up.
- Maximum height for a pit station, including decorations and banners, is 10 Feet.
- Small band saws and drill presses are allowed.



Competition Safety

- Use the buddy system and travel between the field and pits carefully.
- All staff and volunteers will be wearing ID badges.
- Always behave safely, for your own good and to set an example for others.
- Develop a safe lifting plan for the robot and properly secure it for work.
- Ensure that other teams don't have safety issues.





Pit Age Requirement

Children 12 years of age and younger must be accompanied by a legal adult in the pit area. Baby carriages and strollers are strictly prohibited in the pit area. There are special child-sized safety glasses provided.

Pit Station Safety

- ❑ Visitors have to follow all rules concerning PPE.
- ❑ When transporting a robot, make people around you aware of your presence.
- ❑ Do not build shelves or other storage structures so that they hang over other elements of the pit area.
- ❑ Make sure all signs and displays are secured.
- ❑ Make sure your floor is clean.
- ❑ Make sure tools and belongings are stored properly.



Working in the Pit

- Properly use power strips; don't Daisy Chain.
 - Refer to slide 17 - Respect of Electricity
- Keep the area tidy.
- Everyone in the pit should be wearing appropriate PPE.
 - Safety glasses, steel toe shoes, etc.



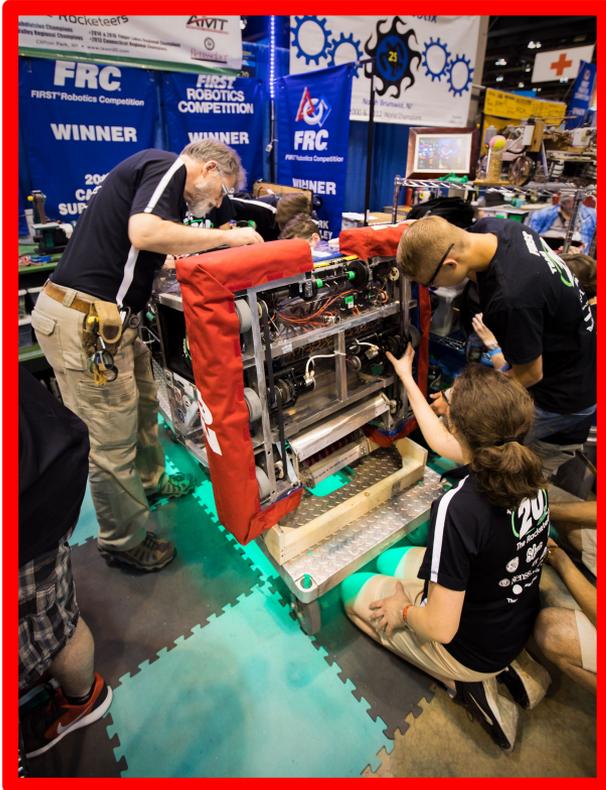


Practice Areas

Make sure there's a well-defined border around your practice areas, so to ensure that robots will not exceed the limits of them and cause damage or injury. As per usual, wear appropriate PPE, handle the robot in a safe manner, and keep the areas clean.

5. Safe Robot Lifting, Handling, and Transporting

Pre-Lift Procedures



- All transporters must wear appropriate PPE.
 - Safety glasses, steel toe shoes, etc.
- Ensure the robot is safe to move,
 - All parts secured.
 - Powered off.
 - No one currently working on it.
 - Enough people to safely lift (2-4).
- Plan out the path and manner in which you lift and carry the robot.
- Clear out the path if it isn't already.

During the Lift

- Someone should oversee the lifting process and coordinate the lifters.
- When lifting, place your feet close to the robot.
- When putting the robot on the cart, make sure the cart cannot roll until you're done placing the robot.
- Enter the playing field using the gate.
- Lifting techniques available on the next page.



Lifting Techniques

- ❑ Lift with your legs and straighten your back.
- ❑ Don't twist; turn with your feet.
- ❑ Use hand holds on the robot and make sure your grip is secure and comfortable.
- ❑ When reaching down, bend your knees, not your back.
- ❑ Tighten your core muscles to help stabilize yourself.
- ❑ Keep the robot close to your body.



Post - Match Procedures

- ❑ Disperse all stored energy in the robot and open the circuit breakers.
- ❑ Make sure all parts are secured and contained.
- ❑ Remove debris from the playing field.
- ❑ Use proper lifting techniques.
- ❑ Use the gate. It is prohibited to climb over the playing field's railing.

PNW District Clackamas Academy Event
MATCH RESULTS Qualification 58 of 74
Powered By Rockwell Automation

| Team # | Rank | Score | Rank | |
|--------|------|-------|------|----|
| 4513 | 2 | 601 | 1432 | 32 |
| 4662 | 7 | | 6959 | 31 |
| 3131 | 19 | | 2550 | 22 |

| Team # | Score | Team # | Score |
|--------|------------------|--------|----------------|
| 4513 | 3 RP | 1432 | 0 RP |
| 4513 | AUTO-RUN 15 | 1432 | AUTO-RUN 10 |
| 4513 | OWNERSHIP 271 | 1432 | OWNERSHIP 158 |
| 4513 | VAULT 20 | 1432 | VAULT 5 |
| 4513 | ENDGAME 65 | 1432 | ENDGAME 10 |
| 4513 | BLUE PENALTY 230 | 1432 | RED PENALTY 25 |

Transporting Procedures

- Stabilize the robot on its cart before transport.
- Keep control of the cart to avoid damage or injury.
- Do not run with the cart.
- Make sure the cart cannot roll when it's supposed to be still.
 - Applying brakes, using a moderately heavy object to obstruct the wheels, etc.
- Use the gate when transporting a robot on and off the field.



6. Safety Awareness and Recognition Programs

Key Objectives

The key objectives are:

1. Reassure the public and staff as to the safety of FIRST events.
2. Inspire people to be safer in individual and group practices.
3. Select winners for the Industrial Safety Award.
4. Congratulate other teams for safe behavior.

To help meet these objectives, the program uses coaching, positive reinforcement, and public recognition. This section will be about meeting the standards of the program.

Advisors and participants will rate safety based on:

1. Safe Behavior
2. Physical Conditions
3. PPE Usage



Safety Advisory Process

Mentors and advisors should teach students about teamwork, proper use of equipment, and safe use of the robot.

Safety advisors will be in green shirts and will observe all activities in competition. They will provide feedback on how to improve safety, including calling teams out for unsafe behavior. They will be available for help on how to be more safe. At the end of the competition, they will pick three teams for the Hard Hat Safety Award.



Presented By  **BOEING**

7. Safety Awards

Hard Hat Pin

- Given to the top three safest teams.
 - Participants will be given the card pictured below to provide feedback.
- Considers the following criteria:
 - Community Outreach.
 - Safety Initiative (at the event).
 - Program Presentations (Safety Program Development).
- Cards are turned in at the end of the competition.

Highlighting Safety

Best Safety Culture
Team # _____

Best Pit Safety
Team # _____

Star of the Day
Name: _____ Team # _____
Your Team # _____

Star of the Day

- Safety Advisors will select the “Star of the Day” each day of the competition.
 - Award will be visible in the team’s pit.
- Participant that wins has made a notable contribution to FIRST safety, such as promoting safety.



Industrial Safety Award Sponsored By Underwriters Laboratories

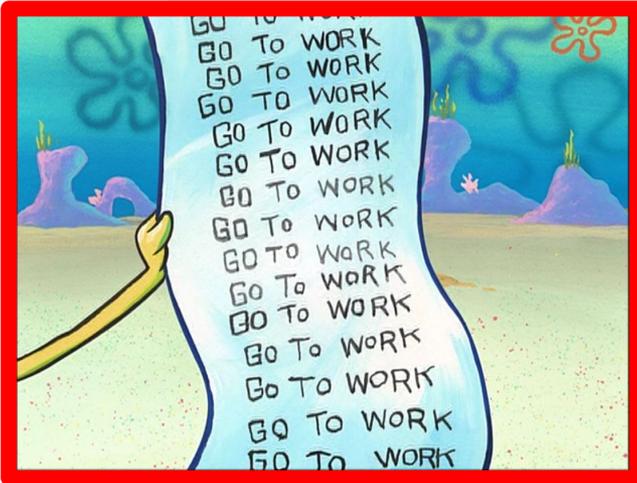
- Given to teams that go above and beyond with their safety and find new ways to protect themselves.
 - In addition, they have to show great safety procedures as well.
- Chosen by Safety Advisors.



8. Safety In Your Work Space

Safety Checklists

- It's recommended that teams put together a safety checklist to track their work.
- Examples:
 - Are all items 18" below fire sprinklers?
 - Are stacked items secure and stable?
 - Are heavy items stored low to the ground?
 - Are floors clean and free of hazards?
 - Are light fixtures working correctly?
 - Are you able to see what you're doing when working on the robot?
 - Are you able to easily access appropriate PPE?
- The full checklist is available [here](#).





General Safety

Make sure to follow all safety rules at FIRST events, including PPE rules and tool use rules. Additionally, maintain a neutral and controlled attitude to help maintain clear and rational thinking.



“

*If Safety is a Joke,
then Death is the
Punchline.*

-Paul Laforest

One More Thing!

I'm providing a link to the PDF of the Safety Manual in the situation that you need it. It can be found [here](#).