

HHMS



# TEAM SAFETY MANUAL

2019 Destination Deep Space Competition Season

FIRST ROBOTICS COMPETITION – TEAM #2080 TORBOTICS  
HAMMOND, LOUISIANA

## FRC Torbotics Team 2080 ~ 2019 Destination Deep Space Safety Manual

### **GOAL**

Torbotics is committed to providing quality STEM education opportunities within a safe learning environment. The goal of this manual is to provide a foundation for FRC Team #2080 to develop and maintain a safe, productive work environment no matter if we are at the engineering lab at Hammond High Magnet School, participating in a community outreach event, or at a competition.

In addition to vigilantly maintaining a safe working environment, it is important to us that every member on our team feels safe when a part of team activities. This includes feelings of both physical and emotional safety. Violations of either will not be tolerated.

### **SCOPE**

It is each team member's role and responsibility to ensure a safe workplace as described in this manual. The purpose of this manual is to define and describe our team's commitment to safe work practices, along with an outline of training, testing, and record-keeping requirements.

### **RESPONSIBILITIES**

#### **Safety Mentor**

The Safety Mentor's responsibilities include but are not limited to:

- Developing specific safety procedures
- Training the Student Safety Captain to coordinate the training of all student team members
- Maintaining an up-to-date list of Material Safety Data Sheets (MSDS)
- Training the Student Safety Captain on emergency procedures for all items covered by the MSDS sheets
- Assist the Student Safety Captain in acquiring any needed materials or additional training she or he deems necessary to promote a culture of safety

#### **Student Safety Captain**

The Student Safety Captain's responsibilities include but are not limited to:

- Performing and tracking safety training for all student team members
- Providing support to student team members on safety questions
- Performing routine safety inspections of the engineering work areas and pit and maintain records of infractions and corrective actions
- Knowing where the MSDS binder is stored and having access to it at all times when the engineering work areas and/or pit is occupied
- Learning emergency procedures for all items covered by the MSDS system.
- Ensuring that the safety area is stocked with necessary supplies and instructions. Ensure that these supplies are brought to competitions and/or outreach events.
- Meet routinely with mentors/coaches and team participants to assess any additional safety training needs and then work to secure these.
- Post safety reminders throughout the engineering work areas.
- Maintain an accident log, as needed.

### **Student Team Members**

The student team members' responsibilities include but are not limited to:

- Maintain a clean, safe work environment
- Follow safety instructions
- Participate in all required safety training
- Request a safety training for any tools they are unfamiliar with before using them
- Remind others when unsafe practices are witnessed
- Identify and report any unsafe or hazardous conditions (including work practices that may cause an accident) to the student safety captain, coach and/or mentors.

### **Mentors, Volunteers & Spectators**

Our volunteers and spectators have responsibilities that include but are not limited to:

- Following all safety protocols posted in the robot work areas to include wearing safety glasses when the robot is being worked on and ear plugs when machines are in use
- Provide guidance and encouragement on maintaining a safe working environment

The entire team is responsible for making sure that all student team members, volunteers and spectators are safe. Everyone is expected to behave in a respectful manner at all times whether we are at school, a community outreach event, or at a competition.

### **SAFETY PROCEDURES PROTOCOL**

There are specific safety procedures that need to be developed and distributed to all student team members and reviewed for understanding. There should be a training log for each student team member that tracks the training received. Safety trainings need to cover the following but is not limited to:

- General safety practices
- Machine shop safety practices and proper use of hand-held tools
- Proper use of electrical devices
- Lockout/tag-out procedures
- Techniques for lifting or raising the robot
- Safe practices with energy storage devices
- Proper handling of batteries

### **TRAINING**

No student shall be allowed to use the tools and machines located in our engineering shop or participate in the procedures covered until it has been verified and recorded that she or he has been fully training either by the Student Safety Captain, one of our mentors or another student designated to provide such training. This rule applies to everyone. Training records for each student team member are kept and maintained by the Student Safety Captain.

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(See the Appendix for a copy of the Student Team Member Training Record Form.)

### INSPECTION/SELF-AUDITING

#### HHMS Engineering Work Areas

All areas at Hammond High Magnet School utilized by Torbotics will be inspected at least once during any day that they are in use. These areas include, but are not limited to: the robot build area, all areas where machines & tools area present, battery areas, the electronics room, the drive room, the business room, and the computer lab. The inspection will be logged on the Team Safety Inspection Form and will be filed in the Safety Manual Binder.

#### Competition Pit Area

The pit area at competitions will be inspected each morning prior to team starting work on the robot. The inspection will be logged on the Team Safety Inspection Form and filed in the Safety Manual Binder.

Persons authorized to perform official safety inspections are, in order of preference:

1. Student Safety Captain
2. Safety Mentor
3. Lead Mentors/Coaches
4. Student team members specifically named by the Student Safety Captain/Safety Mentor/Lead Mentor
5. All other mentors

*\*\*\* All inspection forms will be signed by the person who completed it. If a student team member completed the inspection, a mentor will also review and initial the form.*

#### Safety Violation Reporting and Corrective Actions

Whenever a safety violation is found, it should be recorded on a *Safety Inspection Form*. This form should be filed in chronological order with all forms from routine inspections and also documented on a *Violation Log*. Each violation should also be accompanied by a **Corrective Action Report**. On the Corrective Action Report there should be noted a plan for correction, a timeline for completion and a notation if any additional training might be needed to keep the violation from happening again. *The Student Safety Captain and Lead Mentors will sign off on all Corrective Action Reports.* The Student Safety Captain will monitor action on all Corrective Action Reports.

#### Safety Preparations for Competitions

Two weeks prior to each event, the Student Safety Captain will:

- Meet with the head of each team division (Build, Business, Drive, Electrical, Pneumatics, and Programming) to develop a team and robot specific safety plan.
- Develop a list of any items needed based on the above plan and submit it to the Lead Mentors to ensure any additional items are secured and arrive prior to the event.

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- Ensure completion of a Student Team Member Emergency/Medical Form for each student who will be attending the event.
- Determine if any additional safety training will be needed specific to the event.

### One week prior to event, the Student Safety Captain will:

- Work to ensure all needed safety items are secured and organized to travel to the event.
- Provide all Student Team Members, volunteers & mentors who will attend the event with a training on the official [Safety at FIRST Events](#) procedures.
- Provide support for any safety questions as they arise. Seek guidance, as appropriate, from mentors.
- Compile an [Emergency/Medical Safety binder](#) with the completed *Student Team Member Emergency/Medical Forms* for each student attending the event. Ensure both Lead Mentors are aware of how to access the book at all times.

### Day of trailer “load in” to depart for the event, the Student Safety Captain will:

- Ensure the inspection and appropriate packing of all electrical wires and batteries.
- Ensure that loose parts and large storage items are secured and ready for transport to and from the trailer, along with safe storage on the trailer during travel.
- Work with students in charge of loading the trailer to ensure safe handling of materials.
- Ensure there is a portable safety station loaded onto the trailer, along with an additional travel first aid kit for the bus.
- Ensure that the Emergency/Medical Safety binder, Safety Manual and any other related materials for the event are loaded for transport.

### First day of the event, the Student Safety Captain will:

- Ensure that each student team member is aware of the safety plan for the event in case of an emergency. All team members will be aware of procedures to follow to assure everyone’s safety including a meeting spot to gather at, a buddy system for travel and how to initiate notification if someone needs assistance.
- Perform and log a pit safety inspection prior to start of the day’s activities. Inform mentors and team of any noted violations/concerns.
- Attend the morning student safety captain meeting (occurs typically an hour after pits open). Inform mentors and team of any noted violations/concerns.
- Attend the late afternoon student safety captain meeting (normally three hours prior to pits closing).
- Perform and log a pit safety inspection prior to the pits closing. Inform mentors and team of any noted violations/concerns.

### Second day of the event, the Student Safety Captain will:

- Perform and log a pit safety inspection prior to start of the day’s activities. Inform mentors and team of any noted violations/concerns.
- Attend the afternoon student safety captain meeting (normally two hours after lunch).
- Perform and log a pit safety inspection prior to the pits closing. Inform mentors and team of any noted violations/concerns.

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### Final day of the event, the Student Safety Captain will:

- Perform and log a pit safety inspection prior to start of the day's activities. Inform mentors and team of any noted violations/concerns.
- Attend the morning student safety captain meeting (normally an hour after Opening Ceremonies).
- Ensure that an inspection is performed of all team items prior to load up of the trailer to return to Hammond High Magnet School.

### Following the event, the Student Safety Captain will:

- Perform and log a "pit" safety inspection of all items that were transported to and from the event. Inform mentors and team members of any noted violations/concerns.
- Participate in an After Action Report discussion with Lead Mentors and the team.

# SAFETY PROCEDURE #1

## General Safety Requirements

(Parts of our Safety Procedure Protocol are copied straight from the FRC TEAM SAFETY MANUAL.)

The following are some areas, practices, and functions for which our team has agreed to uphold in accordance with our registration as a FIRST Robotics Competition team and in keeping with our commitment to provide a safe work environment for all participants. This list is not all-inclusive and can be added to at any time. When additional changes are made, the changes will be dated in the Addendum Section and team members will be trained accordingly with a notation made on each student's training log. At events, peer student safety captains, mentors and safety advisor(s) will observe and report any positive safety practices and opportunities for improvement.

- Running and horseplay is not permitted at any time.
- Follow safe work practices, including safe use of all tools and personal protective equipment (safety glasses, shoes, gloves, hearing protection, etc.).
- Maintain a healthy attitude regarding both the physical and social safety of all people.
- Strive to always work in a thoughtful manner, aware as possible of your surroundings.
- Be especially careful around high-speed rotating components, both on and off the robot. If you are putting a high-speed rotating component on the robot, make sure the component is designed to be used the way you are using it. Pushing a component beyond its mechanical capabilities can be dangerous.
- Take special care when working above normal height or ground level.
- Always fully open a ladder and never stand on a non-approved step (ex: workbench or toolbox).
- Be careful using tools that generate heat, such as heat guns and soldering irons. Be aware of objects that may be in the vicinity of the heat source and may catch fire. Also, be aware that these tools often retain heat after being shut off, and should be set down only on appropriate surfaces.

### Stored Energy Plan & Robot Safety

The following activities are REQUIRED when servicing or making repairs to the robot.

- Make sure all team members are aware that work is being done on the robot.
- Avoid working on an energized robot during repairs unless necessary.
- **Best Practice:** Always de-energize the robot before working on it by opening the main circuit breaker ("re-set" lever is released) and unplugging batteries
- **3.1.2 Pneumatic Energy:**
  - When utilizing pneumatic energy, always vent any compressed air to the atmosphere (this applies to all parts of the pneumatic system) Open the main vent valve and verify that all pressure gauges on the robot indicate zero pressure. Make sure that people are clear of the valve before venting it.

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- Relieve any compressed or stretched springs or tubing
- Lower all raised robot arms or devices that could drop down to a lower position on the robot.

### HAND TOOLS

Constructing a robot will require the use of hand tools. Most people think of hand tools as wrenches, screwdrivers, chisels, and so forth, but the term also applies to any hand-held tool or implement used to accomplish a task. Know the tool you are using. Always use the proper tool for the job. Example: DO NOT use a wrench for a hammer or a screwdriver as a chisel.

#### Tool Rules

- Before using any tool, check to see if it is in good condition. (Ex: Is there a weak spot that could break?)
- Don't use defective, dull, or broken tools. DON'T put them back on the shelf; remove them from service and notify the safety captain and mentor so the tool can be replaced or sent for repair.
- When using a tool, place the work on a bench or hard surface rather than in the palm of your hand.
- When using knives/blades, direct your cutting strokes AWAY from your hand and body and be aware of those around you.
- Wear gloves when using which can pinch or cut your skin.

#### Tool Storage

- Store sharp-edged or pointed tools in a safe place.
- When carrying tools, cover the point or any sharp edges with shields.
- NEVER carry unshielded tools in your pocket.
- Don't leave tools on overhead work surfaces. They may fall and strike someone below.
- Store equipment in a location where it will not create a safety hazard or get damaged.
- Mechanical Guards Provide safety guards for power tools where required. Never use any equipment WITHOUT safety guards in place.
- Notify our safety captain and lead mentors of any broken or defective equipment, and take it out of service until repairs are made.
- Proper use and respect for electricity is paramount.

#### **The following are general guidelines for ensuring basic electrical safety requirements are met:**

- Inspect your equipment cords and extension cords routinely to ensure they are in good condition.
- DO NOT "daisy chain" – plug a power strip into another power strip. This could cause the potential for fire of electric shock due to overloading of the circuit.
- Avoid the following electrical power supply setups to prevent overloading:
  1. Extension cord plugged into another extension cord.
  2. Extension cord plugged into a power strip.

3. Multi-device receptacle plugged into a power strip or extension cord.

## **BATTERY SAFETY**

**CAUTION:** Batteries contain acid. This substance, H<sub>2</sub>SO<sub>4</sub>, is a corrosive, colorless liquid that will burn your eyes, skin, and clothing. The Student Safety Captain is responsible for making sure a copy of the Safety Data Sheet for the battery in use is posted in the battery charging station and in the safety manual. The Student Safety Captain, Lead Mentors will ensure that all team members are trained on battery safety. Team members can find emergency handling and first aid procedures specific to the battery the team uses on the SDS, along with proper protection for handling cracked or damaged batteries, and information on disposal of the battery.

### **General Damaged Battery Information and Warnings**

Any battery that is visibly damaged in any way is dangerous and unusable. Don't take a chance- don't use it!

#### **Here are reasons you should not use a damaged battery:**

1. It contains stored electrical energy that could cause the battery to rapidly heat up due to an internal electrical short circuit, and possibly explode.
2. The 12V batteries FIRST provided in your Kit of Parts contain sulfuric acid that will burn human tissue on contact.

#### **Set aside a damaged battery and handle accordingly:**

- Immediately flush any contacted skin with a large quantity of water.
- Seek medical treatment.
- Periodically inspect your batteries for any signs of damage or leaking electrolyte. Remember that a dropped battery may be cracked, but the crack may not be visible and might eventually leak electrolyte.
- Treat it as a hazardous material and process it in accordance with the battery's SDS.
- Don't take a chance- don't use it!

#### **Necessary Safety Materials FIRST recommends that teams keep the following items readily available whenever working with batteries:**

1. A box of sodium bicarbonate (baking soda) to neutralize any exposed acid electrolyte.
2. A pair of acid-resistant rubber or plastic leak-proof gloves to wear when handling a leaking battery.
3. A suitable non-metallic leak-proof container in which to place the defective battery.

#### **Procedure for Handling a Leaking Battery When an electrolyte leak occurs:**

- Neutralize it by pouring the sodium bicarbonate on all wetted surfaces. The bicarbonate of soda itself is not dangerous, and will react with the acid in the electrolyte leaving a safe residue that can be disposed of in a conventional manner such as rinsing with water.
- Follow emergency handling instructions of the SDS and notify mentor.
- Put on gloves before handling the battery.
- Place the battery in a leak-proof container for removal.

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- Be sure to neutralize any acid on the gloves before removing and storing them.
- Seek medical attention if skin came into contact with any chemicals.
- Properly dispose of the battery, which is now a hazardous material.

### At a FIRST event:

- Immediately send the person in contact with acid to the First Aid Station/EMTs.
- Report incident to the pit administration supervisor so that the individual can fill out a Medical Incident Report form. Provide team number and available information.
- Pit Administration will immediately contact Event Management for further instruction from event and venue authorities.

### Battery Disposal

Be sure to dispose of all batteries properly and safely. Most retailers of automotive batteries will accept and properly dispose of them at no cost.

### Charging and Handling

- Keep the battery-charging area clean and orderly.
- Place your battery charger in an area where cooling air can freely circulate around the charger. Battery chargers can fail without proper ventilation.
- Do not short out the battery terminals. If metal tools/parts contact the terminals simultaneously, it will create a direct short circuit. This may cause high heat to develop in the battery terminal/part/tool area and the battery could explode. To avoid the possibility of shorting out the battery terminals and creating a hazardous situation it is required to cover all exposed battery terminals and connections with appropriate insulating material such as electrical tape or tubing.
- Do not charge battery at greater than the manufacturer's maximum recommended rate.

### Ongoing Battery Inspection

- Periodically inspect your battery for any evidence of damage, such as a cracked case or leaking electrolyte.
- Bent terminals can also be a potential leak source.
- Inspect the battery before and after each round of competition.

### Chemical Safety

- Keep chemical containers in good condition.
- Make sure all chemical containers have labels placed by the manufacturer.
- Ensure all labels are legible.
- Become familiar with the chemicals you may use as part of the FIRST Robotics Competition. Read safety precautions and instructions for use located on the chemical's label.
- Store all chemicals in an orderly way. Obtain Safety Data Sheets (SDS) for the chemicals your team uses. These sheets provide information on the correct handling of a spill or injury.

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- If you are exposed to a chemical, notify your safety captain and mentor immediately and consult the SDS if necessary.
- Don't use any highly flammable materials, such as cleaning solutions, at FIRST events.

### **SOLDERING**

Soldering can be dangerous because of the heat from the iron and the chemical fumes and vapors released from the solder and flux.

When soldering, observe the following points:

- Use lead-free solder only and solder with electrically heated soldering iron/gun only.
- No torches or open flames of any kind are allowed in event venues, except by authorized personnel in specified areas (such as the event machine shop).
- Wear eye and face protection.
- Solder in well-ventilated areas.
- Never touch the iron/gun. It heats to extreme temperatures that will cause severe burns.
- Prevent burns by wearing cotton clothing that covers your arms and legs.
- Always wash your hands with soap and water after handling solder.
- Work on a fire-resistant surface.
- Keep your soldering iron in its protective holder when not actually being used.
- Do not leave any hot tools where someone can accidentally contact the hot element.

## SAFETY PROCEDURE #2

### Personal Protective Equipment (PPE)

(Parts of our Safety Procedure Protocol are copied straight from the FRC TEAM SAFETY MANUAL.)

#### **Personal Protective Equipment (PPE)**

FRC Torbotics #2080 recognizes that the first line of safety in any work area begins with the individual participant and his or her attitude toward following best safety practices. The proper use of personal protective equipment (PPE) is an important component that we implement to ensure that everyone is protected from potential hazards in the work area. The following list describes the PPE that all Torbotics participants (team members, mentors and volunteers) are required to wear during the construction, use, maintenance and transport of the robot and during the construction of any field element which requires the use of tools of any kind.

In order to use the HHMS engineering lab for robot construction, the FTC teams we sponsor (#8457 Super Cell, #9961 Storm Chasers, #10703 Cyclones and community-team #13017 Event Horizon) must also adhere to the same PPE and general safety standards.

#### **Eye and Face Protection**

There are several forms of eye/face protection available to provide protection from related hazards, including safety glasses with side shields, goggles, and face shields. Participants are expected to inspect equipment for damage each time it is worn. If damage is noted, the person should let the Student Safety Captain or one of our mentors know so that the item can be properly disposed of and replaced.

#### **Use and Application Wear eye protection in the following situations:**

- When performing any work on the robot including grinding, drilling, soldering, cutting, welding, etc.
- When there is a risk of exposure to flying particles or chemical exposure (such as splashes, splatters, and sprays).

#### **At FIRST events, wear eye protection:**

- Anywhere in the pit station including walkways and team pits.
- In the vicinity of the arena, including the playing field.
- On the practice field.
- Any area posted with signs requiring the use of eye protection (such as the machine shop).

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**Safety Glasses & Protective Eyewear** Safety glasses and protective eyewear are designed to provide a shield around the entire eye to protect against hazards such as splashes of liquids, burns from steam, compressed air, and flying wood or metal debris. To prevent injury, all individuals in the pit area, the practice field area and the arena must wear safety glasses or protective eyewear that is ANSI-approved, UL-Listed, CE EN166 rated, AS/NZS certified or CSA rated. Only lightly tinted yellow, rose, blue, and amber tints are FIRST approved. Reflective lenses are prohibited. Your eyes must be clearly visible to others. The use of anything other than ANSI-approved, UL-Listed, CE EN166 rated, AS/NZS certified or CSA rated eye protection is prohibited.

### **Prescription Glasses**

If you wear prescription glasses that do not have a marked safety rating, you must wear rated safety goggles over them to achieve adequate protection. If you wear marked safety rated glasses, you may use ANSI-approved, UL-Listed, CE EN166 rated, AS/NZS certified or CSA rated side shields. Safety rated glasses, side shields and frames can be identified by markings stating the standard that they are rated to (ex. Z87.1).

### **Hand Protection**

Hand protection is designed to protect against heat, electrical, chemical and mechanical hazards. All student team members and mentors are required to use proper gloves and mechanical tool guards when necessary. All student team members should work with our mentors to ensure the selected glove is the correct one to use for each activity. For example, wear chemical-resistant gloves when handling chemicals. Check your gloves for proper size, absence of cracks and holes, and good flexibility and grip before you wear them.

### **Hearing Protection**

Torbotics maintains a supply of hearing protection devices, such as earplugs, to be used when there are objectionable/questionable sound levels present in the work environment. These earplugs are made available to all participants in the Safety Area in the engineering lab. At events, hearing protection is often available at pit administration should run out for any reason. A mentor can provide assistance in evaluating high-noise tasks and determining appropriate hearing protection devices. If a mentor deems that a task will produce high-noise, he or she will remind team members and other participants to use earplugs.

### **Foot Protection**

When engaged in any team and/or other FIRST activities, participants must wear shoes that completely cover the entire foot. Shoes must be substantial and have closed-toes and heels to protect against foot injuries, regardless of work location. Flip-flops, sandals, mules, lightweight slippers, etc. are not acceptable when working on or near the robot. In some cases, safety shoes or toe guards are appropriate for areas where heavy objects can fall on your foot. Team members are to notify a mentor if such situations are encountered to determine the safest way to proceed.

### **SPECTATORS**

Spectators attending FIRST competitions should follow the same footwear rules as participants. If substantial close-toed shoes are not available, they may enter the pit area as long as they remain in the pit aisles. Spectators that do not meet the footwear requirement for participants, as described above, are not allowed inside individual team pits or in any locations where robots are being worked on. Please note that loose sandals (like flip-flops) or bare feet are not permitted in the pit area under any circumstances.

### **Other Preventatives**

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Team members and mentors are not to wear ties, loose clothing, jewelry, hanging key chains or similar when near or working on moving or rotating machinery. This is to avoid the potential risk of draw in to rotating parts. In the case of individuals with long hair, this risk should be mitigated by *tying back or covering long hair*. A supply of hair ties are kept in the Safety Area located in the HHMS engineering lab and in the pit area in case someone forgets to bring his or her own.

### Safe Robot Lifting, Handling and Transportation

Any team member assisting with the transport of the robot needs to be trained in how to lift the robot properly and safely. We will practice these procedures prior to the beginning of each season and prior to any events should those in charge of transporting the robot change.

### Robot Carts

Torbotics uses a cart to protect team members from muscle strains and other injuries as they transport the robot between the pits and the competition area.

The following will be respected by the team when it comes to the robot cart:

- Carts must remain in the team pit area when not in use for robot transportation;
- All carts should fit through a standard 30-inch door;
- Wheels on the cart must not damage site flooring;
- Do not add music or other sound-generating devices to the cart, with the exception of devices of reasonable volume intended to be activated occasionally to make others in the direct vicinity aware that a robot is on the move for safety purposes; and
- Put your team number on your cart so it can be identified by field personnel.

**NOTE:** All carts must be safe. They must be easy to control and maneuver, and pose no risk to bystanders. Carts identified as unsafe by safety advisors must be made safe before they will be allowed to be used. Always follow recommended practices for lifting, handling and transportation of robots.

### PRE-LIFT PROCEDURES

- Ensure all transporters are wearing appropriate PPE (safety glasses at a minimum are required.)
- Make sure the robot is safe to move:
  1. Are all parts of the robot secured?
  2. Is the robot powered off?
  3. Is anyone still working on the robot?
  4. Are there enough people to perform the lift safely? Two to four people are preferred.
- Before lifting, hold a short discussion to determine the direction and path you will be lifting.
- Ensure that the areas and paths are clear of debris and hazards.

### DURING THE LIFT

- Appoint someone to coordinate the lift to make sure you are all ready to begin.
- Each lifter should place his/her feet close to the robot and adopt a balanced position.
- All persons should lift at the same time using proper body mechanics, these include:
  1. Lift with your legs, keeping your back straight.
  2. Do not twist your body- use your feet to turn your entire frame if you need to turn.

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3. Use proper hand holds to grasp the robot and make sure you have a safe, secure lift point before starting the lift.
  4. Bend your knees to a comfortable degree and get a good handhold. Maintain normal spinal curves.
  5. Tighten your stomach muscles and commence lifting the robot, using your leg muscles if you are lifting the robot up from the floor.
  6. Keep the robot close to your body, and coordinate lift speed with the others.
- Make sure the cart is stable and will not roll, coordinate correct placement of robot on the cart.
  - Use the gate opening to enter the playing field. Climbing over the railing is prohibited.
- Transporting Procedures
- Make sure the robot is stable on the cart before transporting.
  - Keep the cart under control at all times, especially when removing or placing the robot.
  - Lead the cart with a team member who can ensure the safety of those in the path of the travel area.
  - Use patience and control when moving the robot, especially in crowded areas (do not run).
  - Ensure that the cart will not roll away or pose a hazard, especially upon robot removal (use a chock block if necessary).
  - Use the gate opening when entering/exiting the playing field. Climbing over the railing is prohibited.
- Post-Match Procedures
- Relieve all stored energy and open the main circuit breaker on the robot.
  - Ensure that the robot is made safe prior to lifting it off the playing field, no dangling parts, etc.
  - Remove debris from the playing field.
  - Use the above "Pre-lift" and "During the lift" procedures.
  - Use the gate opening to exit the playing field. Climbing over the railing is prohibited.

### Safety in Our Work Spaces

The Student Safety Captain or his or her designee will complete a safety checklist of the HHMS engineering work spaces. Mentors will be available to assist the Student Safety Captain and to provide the team with training on proper safety practices, as needed and required. Should a safety hazard be identified, a team member should report the concern immediately to the Student Safety Captain, Lead Mentor/Coach, or their designee to ensure that the immediate hazard is addressed immediately. The Safety Captain and Mentors will then address a more permanent solution to the concern. Once addressed, the team will meet with the Safety Captain and Mentor/Coach to discuss any needed changes to safety procedures to ensure that the initial concern does not happen again.

### Safety at FIRST and/or Community Outreach Events

All team members will comply with the following safety considerations when participating at any events:

- Wear safety glasses whenever working on or operating the robot
- Wear appropriate clothing
- Refrain from wearing dangling jewelry or loose, baggy clothing near the robots;
- Tie back long hair so that it will not get caught in the robot or other machinery; and

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- Wear gloves to protect hands and fingers when handling the robot or the robot crate; finger injuries are one of the most common injuries at events.

### **The following safety considerations apply at all FIRST Robotics Competition Event(s):**

- To gain entrance to the pit, every person will have to wear a pair of safety glasses or safety rated prescription glasses with side shields.
- Use safe lifting, handling and transportation techniques around the robots at all times.
- Do not use skateboards, ‘hoverboards’, or drones at events.
- Do not bring bottled gas tanks (e.g. helium) to events.
- Do not throw objects (such as paper airplanes) from the stands/bleachers. Competition Safety
- Use the buddy system when traveling and while at the event.
- Note that FIRST staff and volunteers are distinguished by their name badges.
- Travel safely and carefully between the pit and the playing field.
- Demonstrate safe behaviors at all times, even in the heat of competition.
- Establish a planned, safe lifting procedure of the robot, including cart removal after the lift.
- Make sure the robot is properly secured if you must work underneath it. Never work on the robot on an unstable surface.
- Assist and mentor other teams with safety issues.

## **PIT STATION**

### **Setting Up the Team Pit Station**

- Bring and use work gloves for uncrating and re-crating, if a crate is in use.
- Design and set up your pit station safely and use proper tools to construct any components (displays, shelves, banners, etc.)
- Use ladders; don’t climb on items not meant for the task, such as tables and chairs.
- Observe the ten-foot height limit for all portions of your pit station, including banners.
- Small, bench-top band saws and drill presses, with appropriate guards, are allowed in team pit station.

### **Pit Station Safety**

- Control access to your pit station.
- Keep the work area neat and orderly.
- Properly use power strips. Do not ‘daisy chain’ (plugging power strips into one another) or overload the rated capacity of the power strip.
- Keep the aisle immediately outside your pit station clear for pedestrians and robot transit.
- Participants and spectators should be wearing approved personal protective equipment, PPE, in the pit at all times.
- Teams may not build any structure to support people or items for storage over the top of the work area in their team pit station.
- Team structures, signs, banners, or displays cannot be higher than 10 feet above the floor.

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- Securely mount team pit station signs, banners, and displays.
- Be aware of your neighbors. Alert them if there is a hazard in your pit or near theirs.
- Maintain a clean, neat, and orderly pit station at all times.

### **There are inspections after teams leave so be sure to do the following:**

- Clean floor in and around your pit station
- Proper tool storage o Proper care of batteries and battery chargers
- Tidy storage of personal belongings and equipment
- When transporting your robot, politely keep pedestrians alert to your movement.

### **Pit Age Requirement**

- Children twelve (12) and under must have a person eighteen (18) or older with them at all times.
- There will be child safety glasses available to borrow and return at the safety glass station.
- Child strollers and baby carriages are not allowed within the individual pit stations.

### **Using the Practice Field**

If the event has a practice field/area, be sure to obey the rules for maintaining an “exclusion zone” around the area. This zone will help ensure that robots and moving parts will remain within the practice area. It will also help prevent accidents to those persons viewing the sessions or traveling nearby who may not be aware of the movement of the robots. Be sure to wear proper personal protective equipment (PPE) and use safe lifting practices. Make sure the practice field is clear of debris, and be gracious by picking up any foreign materials. The designated volunteers are there to help maintain a safe area. Please cooperate with them.