Safety Manual 2022-2023

La Jolla High Team 2984 Vikings

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1.

General Workshop Safety

Before using power tools of any kind the safety test must be passed.

Robot:

Avoid working on an energized robot during repairs unless necessary.

Electrical Energy:

• Disconnect the electric power source

• 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

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

Miscellaneous Energy Sources:

• 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:

- Check the condition of hand tools, do not use defective or broken tools. If unsure, contact/consult a person with more experience.
- Always keep the work in a vice or secured to a hard surface when using hand tools, avoid holding the object,
- When using sharp objects wear gloves and direct cutting strokes away from your body.
- Tools should always be stored in a safe location, tools with sharp edges should be shielded or stored in a sealed container.

- Do not store tools in an area where they could become a safety hazard.

Mechanical Guards: Never use power tools without safety guards in place, notify a mentor or safety captain and do not use the tool until guards are replaced.

Electrical safety requirements:

• 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:
    • Extension cord plugged into another extension cord.
    • Extension cord plugged into a power strip.
    • Multi-device receptacle plugged into a power strip or extension cord.

Battery Safety:

CAUTION: Batteries contain acid. This substance, H_2SO_4, is a corrosive, colorless liquid that will burn your eyes, skin, and clothing. The team mentor and safety captain should post the Safety Data Sheet (SDS, see example in Appendix) for the battery in use and train all team members about battery safety. You can find emergency handling and first aid procedures 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: the team must 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.
• 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.

If at a FIRST event:

• Immediately send the person in contact with acid to the First Aid Station/EMTs.
• Report any 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 safety. 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 the 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.

Soldering:

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

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3.

Personal Protective Equipment

Eye Protection:

In the workshop:

Safety glasses must be worn in the workshop at all times when past the red line, if a person is behind the red line without wearing safety glasses they will be asked to wear them. If this is refused the person will be asked to leave the workshop area.

Prescription eyeglasses are not a substitute for safety glasses, safety glasses must be worn over the eyeglasses or glasses shields must be worn.

When not in the workshop 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).

Hand protection:

Gloves are provided in the workshop. Hand protection is designed to protect against heat, electrical, chemical and mechanical hazards. Use proper gloves and mechanical tool guards for the application.

Ear protection:

Ear protection is provided in the workshop, it is recommended that ear protection is worn during the operation of loud machinery.

Miscellaneous protection:

- Around machinery (behind the red line or around tools being operated) and during competition events closed toed substantial shoes must be worn at all times
- when near or working on moving or rotating machinery tie back hair if able, avoid: ties, loose clothing, jewelry, hanging key chains or similar loose items

4.

Robot Handling

Cart use:

To protect team members from muscle strains and other injuries as they transport the robot, team members must use a 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

• During the competition put your team number on your cart so it can be identified by field personnel.

Lifting the robot:

• Ensure all transporters are wearing safety glasses

• Make sure the robot is safe to move:

o Are all parts of the robot secured? o Is the robot powered off?

o Is anyone still working on the robot?

o Are there enough people to perform the lift safely? Two to four people are preferred.

• Before lifting, determine the direction and path you will be lifting.

• Ensure that the areas and paths are clear of debris and hazards.

• 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:

o Lift with your legs, keeping your back straight.

o Do not twist your body- use your feet to turn your entire frame if you need to turn.

o Use proper hand holds to grasp the robot and make sure you have a safe, secure lift point before starting the lift.

o Bend your knees to a comfortable degree and get a good handhold. Maintain normal spinal curves.

o Tighten your stomach muscles and commence lifting the robot, using your leg muscles if you are lifting the robot up from the floor.

o 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

• Make sure the robot is stable on the cart before transporting.

• Keep the cart under control at all times.

• 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).