

# **Injury Prevention Program**

*Safety is Everyone's Business and Responsibility.*

This Safety Manual has been made for the use of Leland Robotics Team 604 “Quixilver.” Everyone on the Leland Robotics Team must follow all safety procedures with care so that all injuries can be prevented. Everything that is done on this team must be done with safety as the first priority. The well being of its participants and the success of the team depend on it.

We hope that other robotics teams will use this program as an example to safely compete in the *FIRST* Robotics Competition.

**Tomorrow - your reward for  
working safely today.**

- Charles M. Hayes

-Hareesh Iyer  
Safety Captain of Team 604  
2011-2012

## ***Table of Contents***

<b><i>Safety Guidelines</i></b> .....	<b>3</b>
<i>Personal Safety</i> .....	3
<i>General Safety Rules</i> .....	3
<i>Housekeeping</i> .....	4
<i>Robot Safety Procedures</i> .....	4
<i>Battery Safety</i> .....	4
<i>Working with Machines</i> .....	5
<i>Securing the Workplace</i> .....	5
<i>Chain Safety</i> .....	5
<b><i>Machine Tool Safety</i></b> .....	<b>7</b>
<b><i>Food and Drink:</i></b> .....	<b>9</b>
<b><i>Consequences (for Breaking Rules):</i></b> .....	<b>9</b>
<b><i>In Case of an Emergency</i></b> .....	<b>10</b>
<i>Earthquake:</i> .....	10
<i>Explosion or similar incident:</i> .....	10
<i>Fire:</i> .....	10
<i>Medical Emergency:</i> .....	11
<i>Violent or Criminal Behavior:</i> .....	11
<i>Utility Failure:</i> .....	11
<b><i>Safety Captain Responsibilities</i></b> .....	<b>12</b>
<i>Competition Safety Checklist:</i> .....	12
<b><i>Team 604 Safety Agreement Sheet</i></b> .....	<b>13</b>

# ***Safety Guidelines***

## ***Personal Safety***

1. Always wear ANSI Z87+ approved safety glasses or goggles in designated areas and/or when working with the robot and/or tools.
2. Never wear loose clothing around power tools. Roll up sleeves to your elbows and hide sweatshirt hood-strings to prevent getting them caught in a machine.
3. Remove any accessories such as ties, watches, bracelets, or other jewelry. These items can get stuck in a machine and cause serious injury.
4. Long hair must be pulled back and away from your face at all times.
5. Only wear closed toe shoes.
6. Always wear long pants to avoid lacerations to your legs.
7. Never use compressed air to clean yourselves, your clothing, or anything else on your body. It can result in internal rupture.
8. Always know what the escape plan is in case of a fire, earthquake, or other emergency.

## ***General Safety Rules***

1. Do not fool around or participate in any kind of horse play at any robotics-related function.
2. Do not throw things under any circumstances.
3. No running at places with hazardous objects that can cause injury, such as the competition, workshop, machine shop, etc.
4. Always stay with a buddy. Should one of you be injured, the other one can provide assistance. It is also easier to notice when two people are missing rather than one.
5. Get help for lifting heavy objects (the robot) and use your leg muscles, not your back.
6. Report all injuries to supervisor and/or safety captain and get immediate first aid care for any injury no matter how small. If cuts are not treated immediately they can get infected.
7. Keep a first aid kit nearby at all times in case of an injury.

### ***Housekeeping***

1. Always make sure that machine has completely stopped before cleaning it, removing parts, etc.
2. Keep the machine clean of metal chips and oils that may cause damage to the machine.
3. Use a brush and/or vacuum to remove any chips; do NOT use your hands. Clean oily surfaces with a cloth.
4. Make sure that there is no oil, grease, or chips on the floor to prevent slipping.
5. Clean up all metal chips on the floor with a broom or vacuum.
6. Do not leave tools or any other items lying around. Put everything back in its proper place once you are done.
7. Always keep a first-aid kit in the room.

### ***Robot Safety Procedures***

1. Power up the robot once on its cart before setting it on the ground. Check that it will not move when placed on the ground and powered up. **TURN THE ROBOT OFF** and then move it to the ground before restarting.
2. Wear gloves when picking up the robot.
3. Always wear safety goggles when you are near the robot even if you are not working on it.
4. Always make sure that everyone knows that you are turning on the robot before you do so. Shout “clear” so that your teammates are aware and are able to move away in time.
5. Make sure that the battery is unplugged and removed before working on the robot.
6. Cover all electronics before cutting or drilling to prevent shorts.
7. All wires need to be insulated to prevent electrical shorting.

### ***Battery Safety***

1. Periodically inspect your batteries to check for any cracks, leakages, etc.
2. In case of a suspected spillage:
  - a. Put on proper safety gear (goggles, rubber gloves, etc.).
  - b. Pour some baking soda on the spillage to neutralize the acid.
  - c. The safe residue which is left over can be removed with water, however still use proper safety equipment as the acid may not be completely neutralized.
  - d. Once cleaned, place the battery in a spill-proof container and dispose of it per local, state, and federal regulations.
3. Do NOT drop batteries, as it can weaken and/or crack the outer layer. If a battery is dropped, do not take chances, do NOT use it. It may not appear to leak immediately, but it may in the future.
4. If anyone is exposed to battery acid, immediately clean the skin with large amounts of water; do NOT use baking soda, soap, or any other base. They should then be given professional medical treatment.

## ***Working with Machines***

1. Make sure that you know how to operate the machine before using it.
2. Make sure that you have the permission and supervision of a mentor or teacher advisor before working with the machine.
3. Know how to stop the machine in an emergency situation.
4. Keep hands and other body parts away from moving parts at all times.
5. Never operate a machine unless all of the safety guards are in place.
6. Always make sure that a machine is at a complete stop and turned off before measuring, cleaning, or making any adjustments.
7. Never use a rag or cloth near any moving part of the machine while activated. It could get caught and cause serious damage.
8. Never have more than one person operate the same machine at the same time. Not knowing what the other person might do can cause an accident.
9. Never disturb people who are working on machines. This can cause them to become distracted and not pay full attention to operating a machine.
10. Do not wear gloves when working with a machine. The gloves can get caught and cause someone's hand serious injury.

## ***Securing the Workplace***

1. Remove all burrs and sharp edges with a file and/or deburring knife.
2. Clean the vise with a rag to get all the chips out; do NOT use your hands.
3. Be sure that work piece is securely fastened down in a vise or to a machine table.
4. Never start a machine until you are sure that the cutting tool and machine parts will clear the work piece.

## ***Chain Safety***

1. Do NOT place any body parts in chain, wheels, or drive train when it is moving.
2. Disable ALL moving parts before working with the chain.
3. If anything gets stuck inside the chain, immediately stop it and remove the obstruction.
4. Make sure the chain is greased before using it.

## *Hand Tool Safety*

### A) *Screwdrivers:*

1. Avoid holding the work piece in your hand because you can injure yourself if the screwdriver slips.
2. Never use a hammer on a screw driver.
3. Use the proper screwdriver for the type and size of the given screw head.
4. Never grind the screwdriver to a sharp edge.

### B) *Wrenches:*

1. Only use properly fitting wrenches.
2. It is generally better to pull on the wrench than to push it.
3. Keep knuckles clear of any obstructions when turning a wrench.
4. Pull adjustable wrenches in the direction, which applies the majority of the force on the fixed jaw.
5. Use proper wrenches for tightening and replace nuts with worn corners.

### C) *Hammers:*

1. Never use hammers that are chipped or cracked.
2. Never use hammers on tools or parts that are brittle due to hardening.
3. Never use a hammer that does not have a good, tight-fitting handle.
4. Keep the hammer free of grease and oil.

### D) *Punches and Chisels:*

1. Check the head to make sure it is smooth.
2. Make sure the point is sharp.
3. Hold the chisel/punch firmly and keep it free of grease and burrs.

### E) *Files:*

1. Always file in one direction, away from your body.
2. Keep handles in good condition and tight.

### F) *Hack Saw:*

1. Use the correct blade for the job.
2. Make sure that the blade is secure within the frame, and that your work is securely fastened in a vise.
3. When the cut is nearly complete, ease up to prevent the severed section from causing harm or damaging the part.
4. Do not use excessive pressure.

### G) *Taps and Drill bits:*

1. Keep your hands away from newly cut threads.
2. Always counter bore a hole before you tap it.
3. Avoid hand contact with broken taps.
4. Do not use taps under power unless a tapping head is used.

## *Machine Tool Safety*

### A) *Drill Press:*

1. Clean off vise before use. Make sure that there is nothing inside of it.
2. Make sure your part is securely fastened in the vise.
3. Clamp the vise to the drill press table.
4. When changing a drill bit, counter bore, etc. make sure that the drill press is off.
5. Loosen and tighten the chuck with your hand and a key, if needed.
6. Make sure that you have the right sized drill bit.
7. Make sure that the speed is calculated correctly for the size of the drill bit and the material being drilled.
8. After you put the bit in, turn the drill press on to make sure that the bit is straight.
9. If the work piece slips from the vise or clamp then immediately turn off the drill press, and if it is safe, make the proper adjustments.
10. Deburr all drilled holes.
11. After removing the part, clean off the work area with a cloth/rag/vacuum; do NOT use your hands.
12. Do not place any tools or other items on a drill table. Use a bench or table near the drill press.

### B) *Band Saw:*

1. Clean off the work surface with a rag or air pressure before working.
2. Make sure that the teeth on the blade are pointing down.
3. Rub band saw wax on the blade before using it.
4. Adjust the blade guide to the appropriate height.
5. Move the piece slowly through the blade. Keep your hands away from the blade.
6. If the piece gets too hot, stop the band saw and wait for it to cool.
7. After the piece is cut, clean off the table and deburr the piece.
8. Never cut round stock in a band saw, unless it is securely fastened in a clamp.

### C) *Electric Drills:*

1. Turn off the drill and/or unplug it before changing the drill bit.
2. Tighten the chuck with your hand, do not turn it on.
3. Before drilling, make sure you have permission and supervision of a mentor or teacher advisor.
4. When drilling, keep the drill as straight as possible.
5. When using a drill with a chuck key, make sure you remove the key before you turn the power on.
6. If using a drill with a cord, check to verify the cord's integrity (cracks, exposed wiring, etc.)

D) *Milling Machines and Lathe:*

1. Wear safety glasses when operating a milling machine, regardless of whether the machine has a guard or shield to deflect chips.
2. Long hair should be tied back, and loose clothing should not be worn.
3. Only handle sharp cutters or pieces of metal while wearing gloves.
4. Gloves should be removed BEFORE starting the machine.
5. Do NOT touch ANY moving part, as it can cause severe injuries.
6. Only allow one person to operate the machine at a time.
7. Do NOT use hands to pick up chips with your hands. Use a rag or compressed air.

### ***Traveling Safely:***

1. Have a designated meeting area in case something happens.
2. Always make sure that somebody knows where you are. Use the buddy system.
3. Anyone with handicaps, allergies, or needs medication must inform the teacher advisor or the safety captain before traveling.
4. Do not leave the area you are supposed to be in. For example, do not leave the tournament building at a competition.
5. Always have a cell phone or walkie-talkie near you so that you can contact people if you need help.

### ***Food and Drink:***

1. Never bring any food or drink into the work area.
2. Always wash your hands thoroughly before and after eating.
3. Label all your drinks so that you don't get them mixed up with someone else's.
4. Always clean up any mess you make.

### ***Consequences (for Breaking Rules):***

1. Verbal warning.
2. Written warning and/or 10-push-ups.
3. Call to parent and/or 20 push-ups.
4. Suspension from team and call to parents.
5. Expulsion from team.

## ***In Case of an Emergency***

### ***Earthquake:***

1. If you are indoors, quickly get under a stable surface like a table and cover your head and neck.
2. Stay away from dangerous objects that can fall, like tools, drill presses, etc.
3. If you are outside, move away from buildings, poles, etc.
4. After initial shock, evaluate the situation. If necessary call 911.
5. Be prepared for aftershocks.
6. If necessary, evacuate the building and go to the designated safe spot set by the Safety Captain which should be at least 50 feet away from buildings, poles, or other structures.
7. Do not return to the building unless instructed to do.

### ***Explosion or similar incident:***

1. Immediately take cover under tables, desks, or other object that give protection from broken glass and/or debris.
2. After the effects of the explosion subside, call 911.
3. Evacuate the immediate area of the explosion and go to a safe spot that is at least 300 ft. away from the affected area.
4. Do not touch anything that looks suspicious.
5. Stay away from anything made of glass or other breakable materials.
6. Do not re-enter the building unless instructed to do so.

### ***Fire:***

1. Know the location of all fire extinguishers and how to use them.
2. Activate the building alarm and/or call the fire department.
3. For minor fires that appear controllable, promptly direct the fire extinguisher at the base of the flames. Get help if necessary. Do not take any unnecessary risks.
4. For larger fires that are not controllable, after trying the fire extinguisher, close all doors to confine the fire. Do not lock them. Call for help.
5. Evacuate the building by quickly walking. Assist people who need help, if it does not pose any danger to yourself.
6. Once outside, move to a clear area at least 50 feet (or more) away from the fire.
7. Do not re-enter the building unless instructed to do so.

### ***Medical Emergency:***

1. Make sure the scene of the emergency is safe before entering it.
2. Ask the victim “are you okay?” and “what’s wrong?”
3. Check breathing and pulse. Give artificial respiration or CPR if necessary and only if you have had proper training. Call 9-11.
4. Control serious bleeding by applying direct pressure to the wound without getting any blood on yourself.
5. Keep the victim still and comfortable. Have him/her lie down if it will not injure them further.
6. Keep the victim from going into shock.
7. Try to determine the extent of the injury and/or the probable cause of illness.
8. Try to protect the victim from disturbances.
9. Look for any ID, gather information from witnesses and give all information to emergency response personnel.

### ***Violent or Criminal Behavior:***

1. Do not take any unnecessary chances.
2. Notify the police immediately and supply them with the following information:
  - a. Your name
  - b. The nature of the incident
  - c. Location of the incident
  - d. Description of the person(s) and property involved
3. Assist the police officers involved when they arrive by supplying them with any additional information.

### ***Utility Failure:***

1. Keep yourself and others calm.
2. Make sure that there is a flashlight in the room in case the electricity goes out.
3. If there is potential damage to the building, occupants, or if the utility failure occurs after hours, on weekends, or holidays, notify the police at 911.
4. Notify the teacher advisor, mentor, and/or safety captain. If necessary evacuate the building.
5. If there is a flood or other water damage, stop using all electrical equipment and evacuate the area. Notify any maintenance people available. If serious, call 911.

**When traveling and an emergency occurs, make sure that everyone is accounted for and that they are at the designated meeting spot.**

## ***Safety Captain Responsibilities***

1. Collect Materials Safety Data Sheet logs.
2. Give out warnings and consequences for safety violations.
3. Set up the meeting point when traveling in case of an emergency.
4. Give out copies of the safety manual.
5. Give test on safety procedures and manual.
6. Collect list of names and cell phone numbers.
7. Bring all materials on the competition safety checklist.

### ***Competition Safety Checklist:***

1. First Aid Kit
2. Waterless hand cleaner
3. Extra ANSI Z87+ approved safety goggles
4. Hair ties
5. List of team members' cell phone numbers
6. Gloves
7. Paper towels
8. Small broom
9. Extra Safety Manuals

# Team 604 Safety Agreement Sheet

I, \_\_\_\_\_, confirm that I have read the entire safety manual and agree to follow all necessary safety procedures. If I fail to follow the rules and safety precautions, I understand that I must suffer the consequences of my actions, even if it means permanent removal from the team. I also understand that if I do not sign this sheet and turn it in to the safety captain that I will not be able to participate in team activities.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Parent Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Student Cell Phone Number

\_\_\_\_\_  
Student Home Phone Number

Please list any allergies here. Also, please state if you need to take any medication (for travel purposes): \_\_\_\_\_

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