

**FAMU-FSU COLLEGE OF ENGINEERING
CIVIL & ENVIRONMENTAL ENGINEERING
STUDENT'S SAFETY MANUAL**

General

All levels of administrative and academic management have a responsibility to promote safety and health. Supervisor and instructors who have direct responsibility for working and teaching environments are responsible for ensuring their employees and students freedom from hazards. Ultimately, the individual worker or student must assume personal responsibility for ensuring health and safety for themselves and fellow employees or classmates. The University Director of Environmental Health and Safety and other safety professionals are responsible for overall coordination of the University safety program.

Supervisors and instructors will carefully review, with each employee or student, specific safety rules, policies and applicable procedures. Such are contained within this document and other applicable rules and regulations published by the University. Supervisors will review safe work practices with employees and will take remedial steps to correct deficiencies that jeopardize the health and safety of their employees. Likewise, instructors will promote safe practices in the classroom, laboratory, shop, studio and field.

General Guidelines

1. First, never work alone in the laboratory.
2. No student may work in any laboratory without the presence of the teacher.
3. When first entering the lab, do not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.
4. Perform only those experiments authorized by your teacher. Carefully follow all instructions, both written and oral. Unauthorized experiments are not allowed.

General Tool Safety

Section Overview

Though tools differ in their function, power source, and size general safety rules apply to the use of all tools. This section describes these safety rules, as well as presenting the regulations and standards which apply to tool use,

What are the Regulations and Standards? The Occupational Safety and Health Administration (OSHA) has established regulations that apply to electrically powered machinery, under Subpart O, Machinery and Machine Guarding, and Subpart P, Hand and Portable- Powered Tools and other Hand- Held Equipment. These regulations are found in the Code of Federal Regulations: 29 CFR1910.211-.247.

The American National Standards Institute (ANSI) publishes standards for tool design and safeguarding, including the Safety Standard for Stationary and Fixed Electric Tools. ANSI/UL 987.

General Safety Practices

General safety rules apply to both stationary and portable power tools. The following shop safety rules apply to many of the tools that you use:

The Work Area

- Your work area shall be kept clean. Oily rags, dust, and paper are fire hazards and can damage your tools. Place scrap materials in appropriate containers.
- Keep your work area well lit. If you cannot see your work, then you cannot see a hazard.
- Keep your area dry. Wet floors and work surfaces can cause slips. Water serves as an excellent electric conductor between the ground, you, and your tool.
- Before working with tools that can produce sparks, make sure that the surrounding area is free from ignitable materials.
- Know the locations of fire extinguishers. They shall be the correct type (e. g., A, B, C, D) for the potential fires which could occur in your shop. Also, know where the fire alarm is located and the proper exit route(s) for your work area.

Personal Protective Equipment

- Use personal protective equipment (PPE) when necessary. Safety glasses and safety shoes must always be worn in the Machine Shop. Other PPE includes gloves, hard hats, hearing protection, respiratory protection, special protective clothing, and welding masks. Discuss proper safety equipment with your supervisor.
- When operating the overhead crane, hard-hats, gloves, safety shoes, and safety glasses must be worn. Noise produced by power tools can drown out other sounds in the shop... like a person shouting ‘STOP!’ or ‘HELP!’ Stay alert to your surroundings.
- When cutting certain materials like plastics or epoxies, fumes can be released. Dust is produced when using most every shop tool. To address these potential hazards, discuss the appropriate controls and respiratory protection with your supervisor or Safety Department.

Clothing

- Never wear loose clothing or jewelry that can entangle in power tools. Hand jewelry can serve as a conductor of electricity. Tie back long hair.
- Do not wear neckties while working around machinery.

Tools

- Always use the right tool for the job. Forcing a small tool to do a big job causes the tool to strain. Strained tools can kickback or break, causing injury.
- Never uses tool that you are unfamiliar with. Get proper training from your supervisor, the Safety Department or the tool manufacturer.
- Read the tool manual for proper use procedures and safety precautions.
- Before each use, inspect your tools. Check the alignment of moving parts, breakage of parts, and cracks.
- When you are tired, your attention span is reduced. Attention to your work is very important when working in the shop. Make sure you are fit to do the job.

- Disconnect the power source when performing maintenance, cleaning, or changing blades and bits.
- Be wary of dropping tools. Do not rest a tool on the edge of the workstation. Secure tools when working at heights.
- When using both portable and stationary tools, grip the tool and material being worked- on firmly. Hold tools only by insulated grasping surfaces. The material being worked- on should be well secured.
- Make sure that you are well balanced when operating a tool. Sometimes, a “kickback” from a tool can throw the operator out of balance causing injury.
- Do not work in an awkward position. You may not have complete control of the tool or the material you are working on. Never lock a tool in the ON position if you are working under conditions that require you to stop the tool quickly.
- Guarding is one of the best ways to minimize a hazard. Make sure that machine guards are in place on large and small equipment.
- When cutting materials, try to cut slung the grain. This will reduce the chance of kickback or shattering of the material.

Portable Power Tools

Section Overview

Because of the mobility of portable power tools, they can easily come in contact with the operator’s body. In addition, the source of power (electric, compressed air, liquid fuel, or explosive cartridge) is in close proximity to the operator, thus creating additional hazards. Typical injuries caused by portable power tools include burns, cuts, eye injury, and sprains. Sources of injury include electric shock, flying objects and particles, fires, falling tools, and explosion of gases.

Here are safety precautions to follow when using power tools:

Powered Hand Saws

The main hazard associated with all saws is being cut by the blade. Protection from a rotating or reciprocating blade can be achieved by following these rules:

Inspect blades regularly. Make sure blades are sharp. Keep the saw blades clean. Buildup of material on the blade increases blade friction. This increases the chance of kickback. Make sure that blade guard works properly. Inspect guards frequently to make sure they rotate freely and cover the saw blade when not cutting.

For circular saws, set the blade depth no more than 1/ 8 to 1/ 4 inch greater than the thickness of the material.

A circular saw shall be started and stopped outside the work.

Extra care should be taken at the beginning and end of the sawing stroke to keep the body and cord away from the blade. Do not overload the motor by pushing too hard or cutting a heavy material with an inadequate saw.

Never cut wet wood. Kickback may occur. Inspect the material to be cut before cutting. Look for nails, staples, or other foreign objects that could bind the blade or fly off during cutting.

Hand Drills

The rotating drill bit can serve as a hazard in many ways: It can break and fly off. It can catch the material being worked on, causing the material to rotate freely and hit something or someone.

The drill can slip and the user can be punctured by the bit. To protect from these drill hazards, employ the following when using drills:

Use the correct bit for the material. There are special bits for metal, wood, masonry, plastic and other materials.

Make sure that drill bits are sharp. A dull bit causes the user to press harder on the drill and increases the chance of tool slippage or bit breakage.

Old bits can get metal fatigue. Replace bits according to the manufacturers' guidelines.

Routers

The shaft and bit of a router can turn very fast and cut very quickly. The hazards are similar to drills but can be more severe. The safety rules listed below should be followed when using routers:

Always start the router with the cutting edge in contact with the material to be cut.

When the cutting is complete, turn off the router. Do not lift the router until it has come to a stop.

The base of the router shall always be kept flat on the work surface. If available, use a chip shield to protect from flying objects. Always allow the router to come to full speed before beginning to cut.

Soldering Irons

The main hazards associated with soldering irons include burns and toxic fumes. Follow these safety rules when using soldering irons:

Resting the iron on wood or metal over wood can cause fires. The use of insulated soldering iron holders reduces the fire hazard and chance of burns from accidental contact. The holders should prevent accidental touching of the iron tip.

Make sure that there is adequate ventilation to remove soldering fumes. Lead is harmful if ingested. If lead solder is allowed to accumulate on floors and work surface, it can be tracked home. Keep these areas clean.

Glue Guns

Glue guns can heat glue to very high temperatures. Avoid contact with the tip of the glue gun and the glue itself.

General Chemical Safety

- Chemical safety depends on control and knowledge of hazardous materials and basic chemical properties.

- Potentially dangerous materials are shipped, stored, handled, used and disposed of every day by trained personnel.
- All of these personnel are aware of the hazards involved with these operations and how to control the hazards.

The following are general safety rules that are followed by safe personnel:

- All containers are labeled clearly and completely
- Chemicals are stored by the hazards they possess.
- Eating, drinking, and smoking is not allowed in areas where hazardous materials are stored or used
- Read and understand warning labels and signs
- Safely transport, pour, and handle liquid and solid materials
- Use personal protective equipment as necessary
- Use fume hoods when handling materials
- Read MSDS for safety information before using a material
- Clean up and report spills promptly Use caution when mixing chemicals Always add acid to water
- Never pipette by mouth
- Secure compressed gas cylinders at all times
- Ask your supervisor or the Safety Office if you have any questions about a chemical or hazardous material

CHEMICAL STORAGE

Proper chemical storage is critical in creating a safe workplace. Follow these basic guidelines:

- Store flammable and corrosive materials in approved safety cabinets or in a dedicated area
Store highly toxic, radioactive, or controlled substances in a secure, lockable area

- Do not store chemicals in the fume hoods
- Do not keep chemicals longer than the indicated shelf life Dispose of peroxide forming chemicals before the expiration date on the container
- Oxidizing materials should be stored separately from flammable and corrosive materials
- Store compressed gas cylinders in designated storage areas Avoid storing chemicals on the floor or in high locations K
- Keep all containers securely closed

GENERAL PRECAUTIONS

- Flammable materials should be stored in an approved flammable materials cabinet.
- Keep all sources of ignition away from flammable materials.
- Store acids separate from other hazardous materials
- Never put acids in steel/metal containers
- Liquids should be stored using secondary containment devices
- Never store hazardous materials in the floor or higher than eye level.
- Inspect containers for leaks or cracks
- Discard old, unwanted, damaged containers by contacting the Safety Office
- Do not store chemicals in the flume hoods

EMERGENCY PROCEDURES

A spill, leak, release, fire, uncontrolled reaction, explosion, or accidental contact with a hazardous material requires immediate action to prevent injury or property damage. Report any such emergency to the Safety Office immediately.

Safe Lifting Techniques

The following safe lifting techniques should be employed whenever a task requires lifting or moving materials, especially heavy and/or bulky objects.

The Feet

The Feet should be parted, with one foot alongside the object to be lifted and one behind. The feet comfortably spread gives greater stability and the rear foot is in position for the upward thrust of the lift.

The Back

Use the sit-down position and keep the back straight, but remember that straight does not mean vertical. A straight back keeps the spine, back muscles and body organs in correct alignment. It minimizes the compression of the abdominal organs that can cause a hernia

The Chin

Tuck in the chin so the neck and head continue the straight back line. Tucking in the chin helps keep the spine straight and firm.

The Palm

Gripping with the palms is one of the most important elements of correct lifting. The fingers and the hand are extended around the object to be lifted - using the full palm. Fingers alone have very little power - the strength of the entire hand is needed.

Arms and Elbows

Draw the load close, with arms and elbows tucked into the sides of the body. When the arms are held away from the body, they lose much of their strength, and because the weight is not fully supported on the spinal- axis, back strain can result

Body Weight

The body should be positioned so that its weight is centered over the feet.

This provides a more powerful line of thrust and ensures better balance. Start the lift with a thrust of the rear foot.

In addition to these steps, it is important not to twist the body when lifting. You should lift the object to the carrying position and tuck your body, including your feet. In repetitive work, your position and the position of the material should be such that you will not have to twist your body.

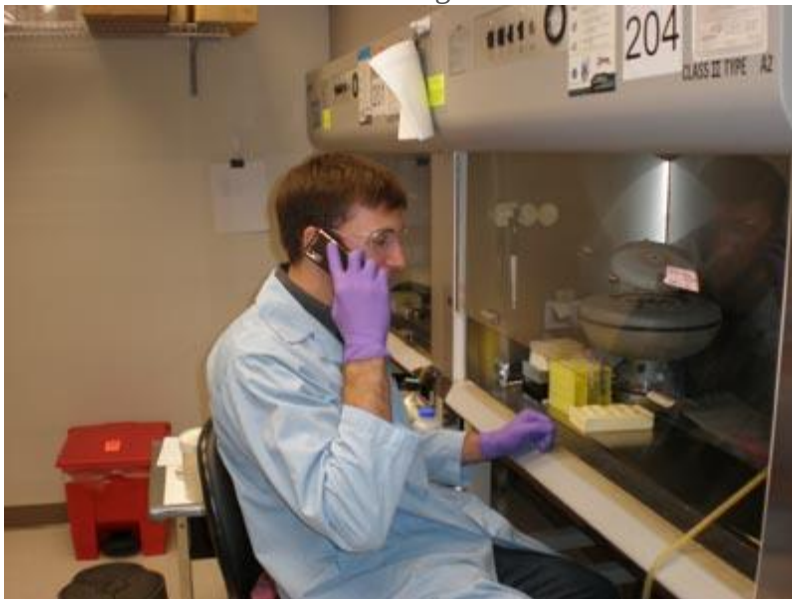
Team Lifting

If the object is too heavy to be handled by one person, get help. When two or more employees are handling the same object, one employee should be designated to call signals. All the workers on the lift should know who this is and should warn him/her if any one of Use crew is about to relax his grip.

When placing objects on a bench or table, first set it on the edge and put it far enough onto the support to be sure it will not fall. Release your grip gradually as you set the object down. Move it into place by pushing with your body and hands from the front of the object. In this way, you will prevent your fingers from getting pinched.

Safety Tips

- 1- Cell phones should not be used while working in the lab



Cell phones and use of music headphones should be avoided while working in the lab. They can be distracting and thereby increase the potential for an accident to occur. They can also become contaminated if handled while working with hazardous materials.

- 2- Eyewash



According to OSHA, more than 2,000 people injure their eyes at work each day in the U.S. Roughly one in 10 of those individuals requires one or more missed workdays to recover, and 10 percent to 20 percent of all occupational eye injuries result in temporary or permanent vision loss.

3- Cluttered workspace



Clean the work area throughout the day and before leaving the lab for the day. If necessary, clean equipment after use to avoid the possibility of exposing the next person who uses it.

4- Mechanical hazards associated with the moving parts



5- Overused multi-plug strip



6- Do not store chemicals or other items in the fume hood

