

Purdue University

Wood Research Laboratory (WRL)

LAB SAFETY GUIDE

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PREFACE

This guide is written with the intent to provide information to all Wood Research Laboratory facilities users that will make each aware of:

- (1) All known hazards present in the Lab that could cause physical impairments or disease to ones health, and
- (2) Procedures, safe guards and training, when properly applied that will prevent the likelihood of physical injury or illness.

Much of the information provided in this guide is required by OSHA (Occupational Safety and Health Administration).

Periodic updates to this guide will be conducted to keep current information available to users, physical plant workers, or anyone with a reason to know.

The WRL Lab Manager is responsible for updating and issuing this guide. However, each user should notify the Lab Manager or faculty member when they identify any hazard that results in injury or illness of themselves or others.

Each person's best efforts and ideas are necessary for continued and improved safe work conditions here at the WRL facility

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Overview

A new lab user will complete the **Safety and Facilities Use Instruction (SFI) Program** before being introduced to the lab's resources.

The SFI program includes hands-on training on each piece of wood and metal working equipment, a thorough review of lab use and safety procedures, plus reading and understanding the WRL Safety Guide is required.

In addition, each user must be familiar with the Purdue Chemical **Hygiene Plan and Hazardous Materials Safety Manual**. Refer to the Hazardous Chemicals and Materials Use section in this guide for further explanation.

Safety Guide Structure

This guide can be divided into two parts. The first part being the main subject material addressing responsibilities of use and safe practices that apply to the lab's use in general. The second part (appendices) will address specific safety practices or specific machine safety in detail. Please use the resources of this guide to its fullest extent.

From the previous page it is obvious that to prevent workplace injuries and illnesses each person must make safety a way of life. You and your fellow users of the WRL have the responsibility to work in a safe manor and assure your fellow workers to do the same.

A few safety guidelines should be kept in mind.

- **Never** do a task you consider unsafe
- **Always** be conscience of other people in the lab
- Understand the capabilities of the machine you are using and **never** attempt to use the machine for other functions.
- **Do not** use a machine that is not functioning properly
- **Ask** for training on an unfamiliar machine or in doing an unfamiliar task. Seeming simple uncomplicated task often present hazards to the untrained person.
- **Concentrate** on the task at hand.

Reading this guide will give you a deeper insight to the importance and the scope of the safety requirements in the workplace. Remember an injury or illness can result in an impairment that will modify the quality of your life and the life of your loved ones.

Overview

Certain job related injury/illness records are required by the Wood Research Laboratory, Purdue University, the Workers Compensation Insurance Carrier, and Occupational Safety and Health Administration (OSHA). These records have various purposes, i.e. meet government regulations, but the main purpose is to use this history to correct problem and prevent future injuries/illnesses to WRL users.

WRL Injury/Illness and Near Miss Reporting

It is required that all injuries (including first-aid) illnesses or near misses resulting from the use of the WRL facility be logged and reported to the lab manager.

Workers Compensation Injury/Illness Reporting

The current university's worker's compensation carrier name and phone number is posted on the bulletin board near the main entrance to the Forest Products Building. It is the responsibility of the building deputy to assure this information is posted.

The Department of Forestry and Natural Resources (FNR) business office will fill out the paper work to report such an injury or illness. The lab manager and WRL business office will give assistance as well. Please notify the FNR business office even if treatment was given by Purdue University Student Hospital (PUSH).

It is to your benefit to report the most minor of injuries or illnesses as this establishes documentation that the occurrence is work related if future medical attention would be required for this mishap. For example, a metal sliver removed from a finger could result in an infection needing medical attention. Another benefit is that tracking these occurrences identifies problem areas. These areas then can be addressed, thereby reducing the chances of more severe injuries or illnesses in the future.

Purdue University Injury/Illness Reporting

Purdue University requires any injury resulting in medical treatment be reported to the Radiological and Environmental Management, 1662 Civil Engineering Bldg, Room B173, phone 49-46371 and that any injury/illness receive initial treatment at PUSH.

Purdue University Injury/Illness Reporting (cont.)

PUSH operates between 8:30 a.m. to 4:30 p.m. with urgent care to 11:00 p.m., phone 49-46504.

For serious injuries call 911.

OSHA Injury/Illness Records

OSHA requires that OSHA defined injury/illness occurrences on OSHA Form No. 200. For the WRL, the OSHA Form No. 200 is maintained by the Department of Forestry and Natural Resources (FNR) business office.

An OSHA recordable injury/illness is generally defined as a condition that requires medical attention on two or more occasions or results in a temporary or long term impairment/disfigurement. For example, an injury requiring stitches must be recorded while a strain, that does not result in restricting one's work, requiring initial medical attention on a follow-up visit, may not be recordable.

The OSHA 200 log, covering the previous year, is posted in the business office from Feb. 1 to March 1. for personnel review.

Due to the nature of wood/metal working machines and testing equipment, there are certain hazards in the work place. It is the intention of the WRL Faculty and Staff to provide a safe work environment for all lab users through identification and elimination, if possible, of workplace hazards and through training of safe use of equipment.

In order to provide this safe environment, every users assistance is required. Any unsafe condition is to be immediately reported to the Lab Manager and/or the WRL Director.

Simple uncomplicated tasks often present hazards that an untrained person would not recognize. For this reason, every user must receive training before performing tasks in a new or changed work centers. The Faculty and Lab Manager will assure that proper training programs are available and being used. It is each user (your) responsibility to assure that the training received gives sufficient confidence in safe performance of the task.

The following pages in this section provide information on achieving safe practices and the use of personal protective equipment.

Safety is **everyone's** concern.

General

A Safety Orientation is conducted with each new user before they are introduced to the lab area. In addition, Safety Training sessions will be conducted periodically to cover changes to the Safety Guide, Hazardous Material Safety Manual, Purdue University or OSHA imposed standard and to provide training on new or modified equipment.

WRL users will be briefed on activities being conducted in the lab and the hazards present as a result. Training, personal protective equipment, etc. will be provided to users as needed for protection against these hazards.

Central Facility and Contract Workers

Central Facility and Contract workers are given a tour of the area in which work will be done. They are made aware of physical hazards and chemical hazards present.

Using guidelines given by OSHA in publications “Personal Protective Equipment” (OSHA 3077) and the OSHA Handbook for Small Business (OSHA 2209) the following guidelines has been established that will reduce the likelihood of bodily injury.

- Clothing should be adequate to cover your body. Clothing and accessories should not be excessively loose or have tassels, fringes, string belts, or other attachments that could get caught in equipment.
- Long hair should be managed and maintained in such a way as to not have free flowing or loose hair that might get entangled in a machine.
- When working in the shop areas of the lab, shoes should completely cover and protect your feet.
- Safety glasses are required when working in the shop area of the lab and anytime when eye injury is a likely possibility. (See section PPE Eye Injury Prevention).
- Hearing protection is required when using the planer, radial arm saw, table saw, CNC router, and strongly recommended when using any of the lab shop machines. (See section PPE Hearing Loss Prevention).
- Other Personal Protective Equipment (PPE) is required when appropriate (See section PPE Overview).
- Gloves are **NOT** to be worn while operating machines where the hands come in close proximity to feed rollers, gears, belts, cutters, etc.
- Never work alone in the shop area of the lab.
- Do not use a machine that is not operating properly.

General

It is estimated that 8 out of 10 American will have a back injury sometime during their lives. And yet, preventing back injury can be as simple as learning proper lifting and material handling techniques, eliminating excess body weight, strengthening neglected back muscles, and adopting good posture habits.

One of the most important changes you can make is to lift with your mind before you lift with your back. Think ahead and if you see hazards, take responsibility for eliminating them, make suggestions to your fellow lab users and the lab manager.

Occupational Safety and Health Administration (OSHA) takes a neutral stand on the use of back support belts for the purpose of back injury reduction. There is not enough evidence that supports or refutes the effectiveness of back support belts. Therefore, WRL will neither encourage or discourage their use.

Proper Lifting Techniques

(Source - Good News for Back Blues by Mary Hass, PPT.)

Most back injuries result from improper lifting. According to the principles of good body mechanics, the worst lifting situation occurs when the body is extended over the load; the lower back becomes a fulcrum supporting the weight of the body plus the load. Keep your back upright to shift weight onto the powerful leg muscles and reduce the lever effect.

1. **Get a firm footing.** Keep your feet apart (shoulder width) for stable base; point toes out.
2. **Bend you knees.** Don't bend at the waist.
3. **Tighten stomach muscles.** Abdominal muscles support your spine when you lift, off-setting the force of the load.
4. **Lift with your legs.** Let your powerful leg muscles do the work of lifting, not your weaker back muscles.
5. **Keep load close.** Don't hold the load away from your body. The closer it is to your spine, the less force it exerts on your back.
6. **Keep your back upright.** Whether you are lifting or putting down the load, don't add the weight of your body to the load. Avoid twisting; it can cause injury.

Back Conditioning

Learning to reduce stress, combined with a sensible diet and exercise program, can relieve back pain and start you on the road to a happier, healthier, and more enjoyable lifestyle.

Reduce stress

Your spine is sensitive to muscular tension that builds up during the day. Organize your daily routine to make it easier on both mind and body.

Exercise

Eighty percent of back pain can be traced to lack of exercise. Start a regular physical exercise program. Increase flexibility while you're building strength. Stretching exercises make muscles more flexible and motion easier.

A Healthier Back

Every move you make, on and off the job, depends on your back. So keep your back in mind throughout your day, while you sit, stand, lift, and carry.

Hand injury is addressed separately from other parts of the body because injuries to the hand represent the highest frequency of bodily injuries. Unsafe use of wood and metal working equipment can cause severe injuries to the hand.

The following is a list of guidelines *that when applied* can reduce the chance of injury to the hand.

- Before activating equipment, note items that can cause injury to the hand within the user's sphere of operation. Look for such items as pinch points, blades, cutters, sprocket, belts, shafts that rotate, hazardous chemicals, ease of operation of manually moving parts, clutter around and on equipment, etc.
- Be conscience of where your hands are at all times during operation of equipment.
- Never put your hand in close proximity to blades, cutters, etc. i.e. use a wood stick to move small off fall pieces away from cutter blades.
- Always work as to not put the hand/arm in to the plane of cutting equipment for example, work on either side of a table saw blade, but don't reach across from one side to the other.
- Wear proper hand protection when working with, hot or cold items, chemicals, handling sharp sided objects, etc.
- Do not wear gloves when working close to feed rollers, chains, belts, gears, or other situations where if the glove got entangled in the machinery, your hand could be pulled in.

Overview

Safety glasses and hearing protection i.e. ear plugs and ear muffs are the most common used Personal Protection Equipment (PPE), but also included are face shields, gloves, steel toe shoes, dust mask, hard hats, other protective devices, and clothing that aid in the prevention of bodily injury.

Before you begin a project evaluate the work area and task being performed. Ask yourself what additional protection can I use to reduce my injury risk. For example, if an overhead danger (low ceiling) is present, wearing a hard hat would be in order. If moving heavy objects, steel toe shoes and the use of lifting devices are in order. When welding, wearing a leather apron, gloves, and welding helmet are appropriate. Almost always the wearing of safety glasses is a must. A quick analysis of any task from the safety standpoint to determine the use of appropriate PPE will greatly reduce your risk of injury.

General

“Disabling eye injuries strike 100,000 workers each year and cost business \$373 million annually, yet all are virtually 100% avoidable.” (Boardroom Reports, September 1, 1991).

OSHA Standard 1910.133 - Eye and Face Protection states “Protective eye and face equipment shall be required where there is a reasonable probability of injury that can be prevented by such equipment.”

OSHA Technical Support recommends that contact lens **not** be worn around any chemical use. The reason is that chemical vapors can damage your contacts and can make contacts adhere to the eye. In the case of chemical splash in the eye, contact lens may start dissolving.

Countless studies and surveys have shown the proper use of safety glasses **prevents** eye injury.

Eye and Face Protection

Face shields and safety glasses are provided by the WRL. Safety glasses are required for all when working with tools and machines in the shop area of the lab.

Face shields **and** safety glasses are required when mixing or handling open containers of chemicals or where there is any reasonable probability of face injury or irritation. Certain work enters may be posted signifying when face shields are required in addition to safety glasses.

An eye wash and a safety shower station are located near the door to Room 105A in the WRL lab. In the event of foreign matter getting into the eyes, the affected eye should be flushed with water at the eye wash station. After a thorough flushing of the eye go to the PUSH for a eye exam.

Prescription Glasses

Persons whose vision requires the use of prescription glasses should wear prescription safety glasses. It is Purdue University’s policy that each department pay for the purchase of prescription safety glasses, limited to 1 pair annually, for its employees requiring such eye protection. The employee must furnish a current eye glass prescription (this can be obtained through the Purdue Vision Eye Plan, call 1-800-622-7444 - cost \$5) to the department business office. The department will then issue a Form 12 Requisition, with prescription attached, to Purchasing. Purchasing has

Prescription Glasses (cont.)

arranged with “Eye Care Associates” 2507 N. Salisbury, West Lafayette to provide this service. Once Purchase Order is issued, the requesting employee must go to “Eye Care Associates” to select their choice of eye class frames. If further information is desired on this subject, call Purchasing at 49-47277.

Contact Lens

All users of the lab that wear contact lens are encouraged to secure prescription safety glasses while performing. Contact lens, in combination with standard safety glasses are permitted but discouraged for reasons previously mentioned.

Introduction

Due to longer life spans, hearing loss prevention during a person's working age years, has become a vital part of a planned enjoyable retirement. Yes, hearing loss is a part of the normal aging process. However, the following article "News About Noise" from an October 1991 National Safety Council publication illustrates that a care-free attitude toward a person's precious sense of hearing has a far greater effect.

"NEWS ABOUT NOISE"

Becoming hard of hearing is no longer just a problem for older adults. Recent studies show that nearly 30 million Americans suffer from severe hearing loss. One third of these are a result of exposure to loud noise.

Noise-induced hearing loss can occur through brief exposure to noise levels greater than 100 decibels, such as firecrackers or gun shots. People can also jeopardize their hearing by listening to less intense noises over longer periods of time.

The National Safety Council encourages people of all ages to protect their hearing on and off the job. The following safety tips can help preserve one's sense of hearing.

- * Wear ear protectors when working or playing around noise-hazardous machinery (any device that produces more than 85 decibels of sound).
- * When listening on a headset with the volume numbered one through ten, keep the volume no higher than four. If you are unable to hear people around you who are speaking in a normal tone of voice, your headset is too loud.
- * Avoid loud music. Sit or stand as far away as possible from the speakers and amplifiers at a rock concert. While driving, keep the radio or stereo low enough to be able to hear the traffic and emergency vehicle sirens.
- * If you experience a constant ringing in your ears or voices seem muffled, have your hearing checked by a doctor.

The sense of hearing is irreplaceable. The National Council suggest safeguarding your hearing at work, at home, and at leisure.

NOISE LEVELS AND THE HUMAN RESPONSE

| Common Sounds | Decibels (db) | Effects |
|--|----------------------|--|
| Normal Conversation | 50-65 | Under 60dB comfortable listening level. |
| Vacuum Cleaner | 70 | More than 70dB, interferes with telephone use. |
| Lawnmower & Heavy Diesel Truck at 20 feet | 85-90 | More than 85 dB. Very annoying, hearing damage begins after eight hours of exposure. |
| Noisy Factory | 90-100 | At 90dB Time Weighted Average (TWA)of 8 hours of exposure, OSHA requires mandatory hearing protection for all workers. |
| Power Saw Chain Saw | 110-115 | More than 100dB. Regular exposure of longer than one minute risks permanent hearing loss. |
| Boom Box - Stereo with more than 120 watts | 120 | Threshold of sound vibration |
| Jet takeoff | 130 | 125dB. Beyond threshold of pain. |
| Shotgun firing | 130 | 125dB. Beyond threshold of pain. |
| Rock concerts | 110-140 | 125dB. Beyond threshold of pain. |

This information is supplied by the National Institute on Deafness and Other Communication Disorders.

Sound and How Measured

Sound (Noise) is a result of pressure changes in air (also other mediums) caused by vibrations or turbulence. Therefore, sound is energy (a force) and is only perceived to an individual as loudness. Hence, it is very appropriate to address noise as “sound energy”.

Sound pressure is measured on a logarithmic scale in a similar way to better known Richter scale used to measure earth quake intensity. Decibels (db) is used to express sound pressure levels and is best explained by the following illustrations.

Sound and How Measured (cont.)

| Increase in dB reading | Increase in sound energy |
|------------------------|--------------------------|
| 3dB | Doubles |
| 10dB | 10 fold |
| 20dB | 100 fold |

To give a feel for the dramatic changes represented by moving up the decibel (db) scale, let's suppose this is a market scale and indicated a return on money invested. Assume you invested \$100 in the market. If the market went up 3 points you would receive \$200, up 10 points you receive \$1000, and 20 points you receive \$10,000 on your initial investment of only \$100.

OSHA Requirements

OSHA requires an employer to administer a continuing, effective hearing conservation program whenever employee noise exposures equal or exceed an 8 hour time-weighted average (TWA) sound level of 85 decibels (noted as "action level") measured on the A scale (slow response) or, equivalently a dose of fifty percent. If necessary, administrative and/or engineering controls and/or personal protective hearing device are required to reduce sound levels within the levels of OSHA Table G-16 illustrated below.

Table G16 - Permissible Noise Exposures

| <u>Duration per day, hours</u> <u>response</u> | <u>Sound level dBA slow</u> |
|---|-----------------------------|
| 8..... | 90 |
| 6..... | 92 |
| 4..... | 95 |
| 2..... | 100 |
| 1-1/2..... | 102 |
| 1..... | 105 |
| 1/2..... | 110 |
| 1/4 or less..... | 115 |

When the daily noise exposure of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C^1/T^1 + C^2/T^2 \dots Cn/Tn$ exceeds ninety, then, the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level.

Conclusions

From the previous information it is obvious that the human hearing sense is very fragile. Not only is workplace noise exposure a factor, but often noise exposure in our private lives is also as significant a factor in causing hearing loss.

Exposure to high levels of noise for just a few minutes can cause some permanent hearing loss. Therefore, when using the WRL facility, each person should be very conscience of noise exposure.

The lab machines that produce noise levels at or above 85 decibels are as follows:

| <u>Machine Name</u> | <u>Approx. Decibels levels</u> |
|---------------------|--------------------------------|
| Table Saw | 92db |
| Radial Arm Saw | 90-106db |
| Jointer | 90-98db |
| Planer | 90-101db |

Wearing of hearing protection is strongly recommended, required for uses exceeding 5 minutes, for these specific machines. It is a good practice to wear hearing protection working with any of the power tools in the lab's shop.

Other areas of the lab or uncommon task will present some high noise exposure hazards from time to time. If in question of noise exposure hazards - wear hearing protection.

Purdue University provides OSHA required annual hearing test for university employees that are exposed to high noise levels. The WRL noise exposure levels are far below the OSHA guidelines, therefore, users of the lab will not need to take annual hearing tests.

If further information is desired on this subject, please call Radiological and Environmental Mgt at 49-41496.

Safety in this area is critical. Machines, when not operated properly, represent the largest single source that can cause the most severe bodily damage. Injuries by machines are caused by, in decreasing order of likelihood:

1. Operator error
2. Operator not properly trained.
3. Machine not properly maintained.
4. Machine not properly guarded.

Another very important safety procedure to practice around machinery is not to wear loose clothing, long free flowing hair, or gloves (unless hands are far from feed mechanisms and other moving parts).

Operator Error

OSHA stats say if every guard is in place, every operator properly trained, every machine properly maintained, that only 11% of the accidents can be prevented. The other 89% is operator error.

Always, always exercise care and caution when operating machinery.

Operator Not Properly Trained

In order to know the dangers of a machine, you must be properly trained. At WRL each person will be trained by the lab manager. Also, owner/operator manuals and prevention maintenance schedules should be well read before operating the machine.

Remember machines have many types of dangers. Metal and woodworking machines have cutters, drill bits, sanding belts, etc., that, even in the stationary position will cause severe injury if struck with a hand, arm etc. i.e. wrench slips on a bolt an hand strikes cutter.

All power sources to the machines should be disconnected or released (see Lockout/Tagout section of this guide) before any work or maintenance is performed. These power sources are usually electric, air, hydraulic, stored energy, etc. Stored energy are springs held in tension, air hydraulic cylinders that will release pressure from activation of a switch even without a source of air or hydraulic pressure, locking devices that when released will allow machine action, etc. The best way to assure a machine is safe to inspect, setup or service is to attempt operation of the machine in all its functions after all known power sources have been disconnected or released.

Machine Not Properly Maintained

Properly maintained machines run more efficiently, have fewer breakdowns and are involved in fewer accidents. Symptoms of machine operation that relate to improper maintenance are often some of the following:

- High noise level
- Problems with material feeding
- Problems with holding tolerances
- Produces poor quality product
- Frequent breakdowns

Many times repairs will be necessary to correct problems caused by improper maintenance.

Machines Not Properly Guarded

Newly purchased machinery is generally well guarded when delivered. However, maintenance and setup often require the displacement or removal of a guard. Assure all guards (refer to Operators Manual) are in their proper position before machine operation.

On some older, shop built, and even new machines, guards may need to be added or modified.

Guards should:

- prevent access to danger areas of a machine i.e. pinch points, cutters
- prevent processing or scrape materials from being thrown into operator's space
- prevent injury in case of tool breakage i.e. cutter or belt breakage.
- not present safety hazards in of themselves

Guards shall always be in place and in good condition when a machine is being operated.

Machine Name _____ Work Center _____

| Yes | No | N/A | |
|-----|----|-----|--|
| | | | Is sufficient clearance provided around and between the machine for safe operation, set-up and servicing, material handling and waste removal? |
| | | | Is machine securely anchored to prevent tipping or other movement that could cause injury? |
| | | | Is the power shut-off switch within reach of the operator's position? |
| | | | Can electric power locked out for maintenance, repair or security? |
| | | | Are the metal parts of this electricity operated machine grounded? |
| | | | Are foot operated switches guarded or arranged to prevent accidental activation by personnel or falling objects. |
| | | | Are manually operated valves and switches clearly identified and easily accessible? |
| | | | Are all emergency stop buttons colored red? |
| | | | Are all moving chains and gears properly guarded? |
| | | | Are operators protected from hazards such as flying chips, pinch points, rotating parts, and sparks? |
| | | | Are machine guards secure and arranged so they do not offer hazard in their use? |
| | | | If special hand tools are used for changing cutters or adjusting, do they protect the operators hands? |
| | | | Are arbors and mandrels free from play? |
| | | | Are provisions made to prevent machines from automatically starting when power is restored after a power failure or shut down? |
| | | | Is the machine free from excessive vibration when used with the largest size tool run at full speed? |
| | | | If machine is cleaned with compressed air, is air pressure controlled and personal protective equipment or other safeguards used to protect operators and other workers? |
| | | | Are saws used for ripping, equipped with anti-kick back devices? |
| | | | Are radial arm saws so arranged that the cutting head will gently return to the table when released? |
| | | | If personal protective equipment like goggles, gloves or vests are required, is it posted on the machine? |
| | | | Are there areas in or around this machine where continuous noise levels exceed 85dB? If so, are signs posted that hearing protection is required? |

Inspected by _____ Date _____

Proper training is a must for machine operators. Every machine is different. For safe operation the operator must understand every control, function, and concept of a machine.

New users of the WRL often don't comprehend the dangers that machines represent. In the training program each person will first observe a machine's operation before being asked to operate the machine. This is an important part of the training, an excellent time to ask questions. Also operator and maintenance manuals should be read and understood before operating a machine for the first time.

No one should operate a machine they don't feel qualified to operate. Refer to the appendices of this guide that contain training programs on key machines that present a possible exposure to serious injury or illness. Assure that you are familiar with these guidelines before operating these machines.

This section will only address general procedures. An operator should refer to the operators manual for specific procedures for individual machines.

Machines with power feeds can often be unjammed by reversing the feed. One attempt to re-feed is usually customary unless the reason (which must be immediately corrected) for misfeeding is identified. Reasons for misfeeding might be a worn or improperly adjusted feed rollers or belts, feed bed in need of lubrication, or misalignment of guide rollers or fences. When correcting feed problems lockout/tagout procedures must be followed.

Machine jamming often occurs in the event of a power failure. In this case, follow lockout/tagout procedures, then loosen hold downs, feed mechanism, etc. and remove in-process components from the machine.

Dull or damaged cutter blades, bits, etc. will impede feed. Visually inspect these items before machine operation. Immediately correct these shortcomings before operating or continuing operation of a machine.

Purpose

This procedure establishes the requirements for the lockout and/or tagout of the energy sources for machines and equipment before any WRL user and/or service support people perform servicing and/or maintenance activities where the unexpected start-up, energization or release of stored energy could cause injury. The energy sources covered by this procedure include electric drive motors, hydraulic or air cylinders and actuators, springs, gravity, electrical current, etc.

This procedure applies whenever a guard must be removed or bypassed to maintain or service machines or equipment, or whenever any employee must place any part of his or her body into an area where injury could result from machine or equipment operation, actuation or energization.

This is an OSHA required program under section 29 CFR art 1910.147 “Control of Hazardous Energy Source (Lockout/Tagout)”.

All WRL users are required to comply with the restrictions and limitations imposed upon them during the use of lockout. No WRL user should attempt to start, energize or use a machine or equipment that is locked or tagged out.

Control Methods

Lockout/tagged out supplies are located in shop area of the lab on the Lockout/Tagout board. These supplies are to be logged out and in when used and returned (see sample log sheet below).

Lockout and/or Tagout Device Log

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------|--------------------|------|------|------|------|------|----------|
| Item (Lock/Tag*) | Lock/Tag Number | Date | Time | Name | Date | Time | Initials |
| | | | | | | | |
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| | | | | | | | |
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Log Out

1. Enter item that is being logged out.
2. Enter number of item being logged. This is for your sole use. Do not loan to another person. For locks the key is to be kept in your sole possession except when equipment is locked out for more than one shift, then the key is brought to the engineering and control office.
3. Enter Date
4. Enter Time
5. Enter Name

Log In

1. Enter Date
2. Enter Time
3. Sign with initials

* Fill out tag completely with the eraser pen attached. Erase information from tag when logged in.

Only a faculty member or the lab manager can remove a lock or tag from a machine when the person using the lockout/tagout device cannot be located. The machine or equipment should be thoroughly inspected and tested before being allowed for general access by lab users.

Lockout or Tagout System Procedure

1. Notify all affected personnel that a lockout or tagout system is going to be used and the reason for use. The WRL user shall know the type and magnitude of energy that the machine or equipment uses and must understand its hazards.
2. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress stop button, open toggle switch, etc.).
3. Operate the switch, valve, or other energy isolating device(s) so that the equipment is isolated from its energy source(s). Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc. Refer to machine's operators manual for specific procedures.
4. Lockout and/or tagout the energy isolating devices with individual lock(s) or tag(s). Tags are to be used in conjunction with locks to identify time, date and person locking out the equipment. Example: a saw with a sole power source of electrical - unplug cord and attach a completed tag to the plug end of cord.
5. After ensuring that no personnel are exposed, and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate.
CAUTION: Return operating control(s) to "neutral" or "off" position after the test.
6. The equipment is now locked out or tagged out.

Restoring Machines or Equipment to Normal Operation

1. After the service and/or maintenance is complete and equipment is ready for normal production operations, check the area around the machines or equipment to ensure that no one is exposed.
2. After all tools have been removed from the machine or equipment, guards have been reinstalled and persons are in the clear, remove all lockout or tagout devices. Remove the energy isolating devices and restore energy to the machine or equipment.

Procedure Involving More Than One Person

In the preceding steps, if more than one individual is required to lockout or tagout equipment, each shall place their own personal lockout device or tagout device on the energy isolating device(s). When an energy isolating device cannot accept multiple locks or tags, a multiple lockout or tagout device (hasp) should be used.