

There are a variety of woodworking operations from assembling wooden pallets to manufacturing cabinets and millwork. These operations can be hazardous if machines and equipment are used improperly or without proper safeguards and employee training. OSHA addresses woodworking hazards in the general industry standard 29 CFR 1910.213.

The following injuries may occur among workers who operate woodworking equipment:

- Laceration
- Amputation
- Severed fingers
- Blindness

The best methods for controlling hazards and preventing injuries in woodworking shops are through **engineering or work practice controls** that eliminate or reduce employee exposure by changing the way jobs are performed. Engineering controls typically involve machine guarding. Work practice controls normally include operator training and instruction for machine use, maintenance, inspections, and use of guards and tools. In the event that these controls are not sufficient, Personal Protective Equipment (PPE) should be provided as supplemental protection.

## Machine Guarding

Machine guarding is the primary engineering control for woodworking machinery hazards. Woodworking operations are especially hazardous when machines are improperly used or are not equipped with the required safeguards. Moving machine parts, including the point of operation, power transmission apparatus, and rotary or reciprocating parts, must be safeguarded. Three commonly used guards are:

- Fixed/permanent
- Adjustable
- Self-adjusting units that move according to stock sizes at the point of operation

Machine guards must be secure, and workers should not be able to easily bypass, remove, or tamper with guards. **Workers must be instructed to never remove machine guards.** They are on the equipment to provide protection from injury. **In addition, missing or damaged machine guards should be reported immediately!** They are required to be on the equipment to protect workers from getting injured. Damaged guards could become a hazard and lead to an injury.

## Work Practice Controls

Every industry has basic safety rules. The following rules are the most frequently used in woodworking shops:

- **Use push sticks:**  
Use push sticks instead of your hands to guide short or narrow pieces of stock through saw blades.
- **Never wear loose-fitting clothing:**  
Wear comfortable, long-sleeved shirts and long pants (loose articles of clothing can easily become entangled in a power tool, which can be very dangerous.)
- **Consider your hair and accessories:**  
Long hair should be covered, and jewelry that can be caught in equipment should be removed prior to beginning work.
- **Never use equipment without being trained:**  
It only takes a few minutes to learn how to properly use equipment, but a lifetime dealing with the consequences of being injured from using equipment improperly.



- **Avoid distractions:**  
Always finish a cut or any other action with a power tool before dealing with any distraction.
- **Never stand on benches, cans, pails, or boxes:**  
You can easily fall after losing balance and become injured stepping or jumping down from the elevated surface. Use ladders and stools instead.
- **Never reach over a blade to remove cut offs:**  
Do not put your hands anywhere near a moving blade, especially when attempting to remove waste or cut offs. Wait until the blade has stopped moving, and then reach or use a piece of scrap or a push stick to move the waste away from the blade.
- **Shut off the power:**  
When completing an operation on a machine, employees should always wait until the machine stops before leaving the machine or setting up another cut.
- **Use lifting equipment or team lifting:**  
Avoid manual lifting of heavy or awkward objects or parts. Use equipment and get help.
- **Housekeeping:**  
Always keep your workspace clean. Place debris in containers located away from under your feet to avoid slips, trips, or stepping on it and becoming injured.
- **Practice compressed air lines safety:**  
Keep compressed air lines safely coiled or placed on the floor where they are not tripping hazards or where they cannot get tangled or caught on benches or equipment. Employees should not use compressed air to clean themselves off or to remove wood chips. Air nozzles should be equipped with 30psi cutouts to prevent puncture injuries.
- **Disconnect power before blade or bit changes on power tools:**  
Don't just check to see that the switch is off, as a switch could get bumped or malfunction and become accidentally activated.
- **Use sharp blades and bits:**  
A dull cutting tool is a dangerous tool and requires that the tool and the woodworker work harder to complete the desired task. A dull blade will be more likely to kick-back or bind.

## Personal Protective Equipment

- **Safety glasses:**  
Safety glasses are to be worn at all times when employees are exposed to machinery, tools, or compressed air.
- **Wear hearing protection:**  
When working with loud woodworking tools such as routers and planers, or when using compressed air tools, employees should be wearing appropriate protection. Extended exposure to such loud noises are known to cause permanent hearing loss.
- **Hand and foot protection:**  
When handling heavy wood products that can cause injury, workers should wear appropriate gloves and footwear.  
**Exception:** do not wear gloves if there is a danger of getting them caught in machinery.

## Material Handling

- Material handling should be performed with forklifts and other powered equipment. Battery powered industrial trucks should be used whenever possible.
- Use only forklifts approved for the electrical classification of the area in which they are operating. If it is not feasible to use battery powered equipment, propane- or diesel-powered industrial trucks should be used. The trucks must be properly tuned-up or catalytic converters should be added to reduce carbon monoxide emissions.

- Forklifts should be operated and refueled by trained and authorized employees.
- Battery charging areas should have local exhaust ventilation and be located away from any ignition source.

**Note:** Careless handling of powered industrial trucks may result in property loss such as collision with fire doors or sprinkler piping or dropping loads or containers of flammable liquids. Fires can occur from fuel spills or may start with electrical short circuits or battery explosions during recharging of battery operated trucks.

## Hazard Communication

A written hazard communication program must be implemented to ensure that employees are instructed and trained in chemical and other workplace hazards.

## Wood Dust Hazards

Wood dust presents a variety of workplace safety hazards, including:

- Slip and fall hazards
- Allergic respiratory symptoms, mucosal and nonallergic respiratory symptoms, cancer, asthma, hypersensitivity pneumonitis, and chronic bronchitis caused by breathing airborne wood particle
- Dermatitis and other allergic reactions that can be caused by contact with irritant compounds in wood sap

Wood dust and chemical hazards can be mitigated by combining engineering and work practice controls supplemented as needed with proper Personal Protective Equipment (PPE) such as:

- Facemasks
- Respirators
- Goggles
- Safety glasses
- Face shields
- Gloves

The control of sawdust is an ongoing challenge for all woodworking operations. The method used most often is a pneumatic duct conveying and collection system. (See the Fire Prevention section below.)

An industrial hygiene program should be established for periodic monitoring of wood dust and, where appropriate, chemical exposures. Employee use of respirators requires a written respiratory protection program that addresses:

- Selection
- Fit-testing
- Use
- Cleaning and maintenance of The National Institute for Occupational Safety and Health (NIOSH)-certified respirators
- Employee training
- Medical evaluations

Emergency eyewash facilities and safety showers capable of providing at least a 15-minute flush of running water are required for battery charging and chemical handling areas.

**Note:** Compressed air should never be used for dust blow-down, which creates an explosion hazard with formation of a combustible dust cloud.



## Fire Prevention

The major key in fire prevention for woodworking facilities is removing wood dust and minimizing accumulation. Machinery that produces dust should be properly fitted to a dust collection system. The type of collection system and safeguards required will depend largely on the volume of dust being generated and the size of the particles. For instance:

- A separator or cyclone system is used for handling coarse particles like chips and splinters from machines such as molders, shapers, or planers.
- A bag-house system or filter system handles fine dust from processes such as high-speed routing, especially of medium density fiberboard (MDF).

Fire protection requirements for dust collectors and ductwork vary based on the type of equipment and severity of the hazard. One severe hazard that arises involves a spark being generated and picked up by the pneumatic system. Sparks are easily generated in the normal operation of many production machines. The material being collected by the system is highly combustible. A spark that reaches the collector or storage bin will almost certainly result in a fire or explosion. Dust collection ductwork should be galvanized metal, provided with explosion venting and be properly bonded and grounded.

Dust collection equipment may be protected by an automatic sprinkler system, as well as a number of other options including suppression systems, spark detection, abort gates, flame-quenching devices, and explosion venting. The duct from the central collector to the storage bin should have a flashback prevention system to keep explosions from blowing back through the conveying ductwork into the building or into other equipment. Dust bins should have an audible or visual warning system with smoke, heat, or light detectors that shut down the fuel and oxygen supply in event of a fire.

Engineering plans should be available to ensure conformity of the dust collection systems to National Fire Protection Association (NFPA) standards and ensure that the manufacturer's recommendations for maintenance are implemented.

Housekeeping practices should include routine cleaning of beams, ceilings, spaces above equipment, and all surfaces having dust layers over 1/8 in. Dust layers as small as 1/32 in. thick or the diameter of a paper clip wire can be sufficient to produce uniform dust clouds within the explosive range of most dusts. Vacuum systems with static-reducing devices should be used to pick up dust.

## Additional Fire Safety

In addition to dust, the high fire load of flammable and combustible materials and natural ignition sources increase the probability of major fires and explosions. Additional fire loading may include plastic materials that, when ignited, generate dense toxic fumes that may further impede fire-fighting efforts.

The leading causes of fire in woodworking operations are due to faulty or malfunctioning wiring and electrically operated equipment, ignition of wood dust, ignition of paints and solvents, and failure to observe smoking restrictions. All equipment, circuit breakers, electrical boxes, and other sources of ignition should be regularly inspected.

Woodworking facilities should be equipped with appropriate sprinkler or fire suppression systems, and these should be monitored by a central monitoring station and inspected quarterly by an authorized sprinkler contractor. If the building is occupied by more than 100 employees, the National Fire Protection Association (NFPA) requires that a fire alarm system be installed, tested, and maintained in accordance with NFPA 72 National Fire Alarm Code. The system should be monitored by a central monitoring station alarm company with automatic retransmission of fire alarm signals to the fire department.

## Smoking

Smoking should be prohibited in any woodworking facility. However, if smoking is to be permitted, designated smoking areas away from flammable and combustible material storage should be provided with noncombustible receptacles for smoking material disposal. "No Smoking" signs should be posted in all other areas of the facility.

## Spray booths

Another source of fire in woodworking environments is paint buildup from spills and overspray that can spontaneously ignite or be ignited by sparks or other sources.

Spray booths must be constructed of noncombustible materials such as steel, concrete, or masonry. Explosion-proof equipment, wiring and lighting, and mechanical ventilation that operate during spraying activities should be provided. Spray application of flammable and combustible materials requires an approved automatic extinguishing system that protects the spray booth or room and ventilation exhaust ducts. (If automatic sprinkler protection is not provided due to inadequate water supply, then a dry chemical, CO<sub>2</sub>, automatic foam, or clean-agent extinguishing system is acceptable.) All sprinkler heads should be covered with cellophane or thin, paper bags to prevent accumulation of overspray. These should be changed regularly. Inside flammable liquid storage should not exceed 120 gallons of flammable or combustible liquids in any one approved cabinet. Not more than three approved cabinets may be present in the same storage area. Flammable and combustible liquids in excess of 360 gallons may be stored in a noncombustible, inside storage room with a minimum two-hour fire resistance rating. In addition to self-closing fire doors, the storage room should be protected by an automatic sprinkler system, spill-containment, explosion-proof electrical equipment, and ventilation equipment designed to maintain a change of air at least six times per hour.

The use of flammable materials outside a storage cabinet or room should be limited to the amount required for a single day's work. Solvents and thinners with a flashpoint below 100 degrees Fahrenheit should not be transferred between containers unless both containers are bonded and grounded. Keep flammable materials in covered containers when not in use.

## Electrical

- Electrical systems should be rated for the projected use and protected by appropriate, labeled circuit breakers.
- Fully enclosed, dust-tight electrical equipment should be present in woodworking operations that produce moderate dust levels.
- The wiring in the building and on the equipment should be inspected periodically for damage and fraying. Worn or torn insulation coverings and heat from defective or improperly installed wiring can ignite nearby flammable and combustible materials.
- Equipment prone to accumulating static electrical charges should be grounded.
- All machines must have a main power disconnect for lockout/tagout.
- Report damaged wiring, including cords pulled out of equipment, damaged cords, damaged plugs, missing ground plugs, damaged outlets, and exposed wiring. All of these could lead to electrocutions, electrical shock, and fires.

## Maintenance

Effective maintenance involves keeping cutting tools sharp to reduce fires originating from saws, sanders, and other milling equipment. Mechanical dust-conveying equipment, such as augers and conveyor belts, should be serviced regularly and properly lubricated to reduce the buildup of heat and excessive noise levels.

## Lockout/Tagout

To ensure that all potential and existing power sources are shut off and locked out for machine maintenance, a written lockout/tagout plan should be developed for each machine. The plan should describe all power sources and the correct procedure for shutting down, testing, and re-energizing equipment. Training must be provided to both authorized maintenance workers and affected employees.



## Noise

Excessive noise levels can be reduced or eliminated by identifying noises produced by motors, gears, belts and pulleys, and points of operation, such as where blades touch wood. Sound may also be transmitted by vibration or resonance from the frames, footings, and housings of the equipment. Noise can be controlled or eliminated through proper equipment maintenance and lubrication, isolation, stabilization, and damping.

Additional controls for reducing noise intensity before it reaches the human ear involve:

- Segregating operations to limit the number of employees exposed
- Enclosing equipment within barriers designed to absorb or reflect noise
- Moving or locating noise-producing equipment away from employees

Hearing protection devices will likely be required given the nature of woodworking operations. They should be used as the final line of defense against excessive noise when engineering and work practice controls are not sufficient. Employers must implement an effective hearing conservation program when employee noise exposures are at or above an eight hour time-weighted average (TWA) of 85 dBa.

### More Information:

#### **Guide for Protecting Workers from Woodworking Hazards**

[https://www.osha.gov/Publications/woodworking\\_hazards/osha3157.html](https://www.osha.gov/Publications/woodworking_hazards/osha3157.html)

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