

MACHINE AND WELD SHOP SAFETY

INTRODUCTION

All people will adhere to the following machine shop safety rules. Violation of any of these rules may result in your losing permission to use the equipment.

General Shop Safety Rules

1. In case of injury, no matter how slight, report it to the shop supervisor. The campus emergency phone number is **9-911**.
2. Do not attempt to remove foreign objects from the eye or body. Report to the student health service for medical treatment. If chemicals get in the eye(s), wash eye(s) for 15 minutes in an open flow of water before proceeding for medical treatment. Notify campus rescue at **9-911**.
3. Safety glasses, cover goggles, or face shields are required when in any shop area, whether working or not!
4. Shoes must be worn in any shop area. No one **wearing sandals** will be allowed to enter any shop area. The minimum footwear must cover the entire foot.
5. Do not wear ties, loose clothing, jewelry, gloves, etc. around moving or rotating machinery. Long hair must be tied back or covered to keep it away from moving machinery. Hand protection in the form of suitable gloves should be used for handling hot objects, glass or sharp-edged items.
6. Wear appropriate clothing for the job (i.e. do not wear short sleeve shirts or short pants when welding).
7. Do not operate any item of equipment unless you are familiar with its operation and have been authorized to operate it. If you have any questions regarding the use of equipment, ask the technician.
8. No work may be performed using power tools unless at least two people are in the shop area and can see each other.
9. Avoid excessive use of compressed air to blow dirt or chips from machinery to avoid scattering chips. A brush, hook, or special tool is preferred for removal of chips, shavings, etc. from the work area. **Never** use the hands. Never use compressed air to clean clothing, hair, or aim compressed air at another person.
10. Practice cleanliness and orderliness in the shop areas.
11. Machines must be shut off when cleaning, repairing, or oiling.
12. Do not work in the shop if tired or in a hurry.
13. Never indulge in horseplay in the shop areas.
14. All machines must be operated with all required guards and shields in place.
15. Keep fingers clear of the point of operation of the machines by using special tools or devices, such as push sticks, hooks, pliers, etc. **Never use a rag near moving machinery.**
16. A hard hammer should not be used to strike a hardened tool or any machine part. Use a soft-faced hammer.
17. Keep the floor around machines clean, dry and free from trip hazards. Do not allow chips to accumulate.
18. Think through the entire job before starting.
19. Before starting a machine, always check it for correct setup and always check to see if machine is clear by operating it manually, if possible.
20. Do not drink alcoholic beverages before or during work in the machine shop area. Do not bring food/snacks into the shop.
21. If you have not worked with a particular material before, check the hazardous materials data sheets book for any specific precautions to be taken while working with the material. Also, ask the shop personnel before cutting any unusual material.
22. Heavy sanding and painting should only be done in well-ventilated areas.
23. Follow all appropriate precautions when working with solvents, paints, adhesives or other chemicals. Use appropriate protective equipment and ventilation.
24. **Don't rush or take chances. Obey all safety rules.**

Lathe Safety Rules

Shop staff approval is required before using any lathe equipment.

1. Make sure that the chuck, driveplate, or faceplate is securely tightened onto the lathe spindle.
2. When removing the chuck, driveplate, or faceplate **do not use the machine power.**
3. When installing the chuck, driveplate, or faceplate **do not use the machine power.**
4. Move the tool bit a safe distance from the collet or chuck when inserting or removing work.
5. Don't run the machine faster than the proper cutting speed.
6. In setting up the tool holder, place it to the **left side of the compound slide** to prevent the compound slide from running into the chuck or spindle attachments.
7. Always clamp the tool bit as short as possible in the tool holder to prevent it from breaking or chattering.
8. Always make sure that the tool bit is sharp and has the proper clearance. Ask for assistance making adjustments.
9. **Remove chuck key from chuck immediately after using.**
10. If any filing is done on work revolving in the lathe, file left handed to prevent slipping into the chuck. **Never use a file without a handle.**
11. If work is turned between centers, make sure that proper adjustment is made between centers and that the tailstock is locked in place.
12. If work is being turned between centers and expands due to heat generated from cutting, readjust centers to avoid excessive friction.
13. **Do not** grasp or touch chips or turnings with your fingers, but get rid of them using a blunt instrument.
14. Turn off the lathe before clearing chips. **Do not** leave it running.
15. Set the tool bit on center line of work to prevent work from climbing over tool or cutting above center and dragging.
16. Don't cut work completely through when turning between centers.
17. Turn chuck or faceplate through by hand before turning on lathe power to be sure there is no binding or clearance problem.
18. Stop the machine before taking measurements.
19. **Before cleaning** the lathe, remove tools from the tool post and tailstock.
20. Never run the machine faster than the correct cutting speed.
21. Always stay at the machine while it is running.
22. Don't take too heavy a cut or use too rapid a feed.
23. **Remove the collet tightening wrench immediately after using it.**

Milling Machine Safety Rules

Shop staff approval is required before using any milling equipment.

1. Work must be clamped securely in a vise and vise clamped tightly to the table, or work must be clamped securely to the table.
2. Do not take climb milling cuts on the shop's mills unless instructed to do so.
3. Make sure cutter is rotating in the proper direction before cutting material.
4. Before running machine, the spindle should be rotated by hand to make sure it is clear for cutting.
5. Make sure the power is off before changing cutters.
6. Always use the proper cutting fluid for the material being cut.
7. Never run the machine faster than the correct cutting speed.
8. Make sure that the machine is fully stopped before taking any measurements.
9. Always use cutters which are sharp and in good condition.
10. Don't place anything on the milling machine table such as wrenches, hammers, or tools.
11. Always stay at the machine while it is running.
12. Don't take too heavy a cut or use too rapid a feed.
13. **Remove the collet tightening wrench immediately after using it.**
14. If at all feasible, rig a guard or shield to prevent chips from hitting other people.

15. Use the milling machine spindle brake to stop the spindle after the power has been turned off.
16. **Before cleaning** the mill, remove cutting tools from the spindle to avoid cutting yourself.

Welding Safety Rules

Shop staff approval is required before using any welding equipment.

1. Welders, assistants, and anyone else in the welding area shall wear glasses or shields of recommended shades during welding operations.
2. A screen shall be erected around the welding area to protect other personnel in the shop from injury.
3. Be alert to possible fire hazards. Move the object to be welded to a safe location, or remove all flammable materials from the work area.
4. Some metal materials emit noxious gases or may be directly flammable/explosive when welded. Be sure to discuss the material with knowledgeable shop personnel or consult material data sheet.
5. Never weld in the same area where degreasing or other cleaning operations are performed.
6. Keep suitable fire extinguishing equipment nearby and know how to operate it.
7. Inspect all welding equipment to be used, prior to each use for possible damage.
8. Avoid handling oxygen bottles with greasy hands, gloves or rags. Fatal explosions have resulted from this cause.
9. Always strap tanks to a welding cart or a fixed object. Never allow a gas cylinder to be free standing. Replace the safety cap on all cylinders when not in use.
10. When arc welding, make sure work and/or work table is properly grounded.
11. Do not arc weld in a wet area.
12. Shut off the cylinder valves when the job is completed, release pressure from the regulators by opening the torch valves momentarily and back out regulator adjusting valves. Never leave the torch unattended with pressure to the hoses.
13. Utilize all protective equipment and clothing. Do not arc weld with any part of the body uncovered, the arc light is actinic light (excessive ultraviolet) and will cause burns similar to severe sunburn.
14. Never weld inside drums or enclosed spaces without adequate ventilation or the use of airline respirators or self-contained breathing apparatus.
15. Check the ventilation system before starting to weld and periodically thereafter to insure adequate performance. **Welding fumes should not be allowed to get into the rest of the shop working areas.**
16. Never cut or weld any container that has held explosive or flammable materials. Use prescribed methods for cleaning or flooding.
17. Never use wrenches or tools except those provided or approved by the gas cylinder manufacturer to open valves. **Never** use a hammer to open or close valves.
18. Abide by any other safety measures required for each particular type of welding.
19. Allow for proper ventilation when brazing or soldering. The fluxes are acidic and toxic.
20. Do not weld on painted, galvanized or greasy, oily metals. Not only can the fumes be toxic, but the welds will not be satisfactory and will fail in use.

Band Saw Safety Rules

Shop staff approval is required before using any band saw equipment.

1. The upper guide and guard should be set as close to the work as possible, at least within 1/4 inch.
2. If the band breaks, immediately shut off the power and stand clear until the machine has stopped. Immediately inform the technician. Technicians will install new blades.
3. Use the proper pitch blade for the thickness of the material to be cut. There should be a least two teeth in the material when cutting aluminum and three teeth when cutting steel.
4. **Do not run** the band saw at a higher speed than recommended for the material being cut.
5. If the saw stalls in a cut, **turn** the power off and reverse the blade by hand to free it.
6. All work pieces must be clamped securely. -----
7. Do not allow blade to rapidly impact work piece. ----- Marvel saw only
8. Set feed rate properly. -----

Bench/Table Grinding Safety Rules

Shop staff approval is required before using any grinding equipment.

1. Abrasive wheel machinery shall not be operated without the appropriate guards in place.
2. Tool rest on bench or pedestal grinders should be set no more than **1/8 inch** from the wheel.
3. Never use a wheel that has been dropped or received a heavy blow, even though there may be no apparent damage. Such wheels may be weakened or unbalanced enough to fly apart on startup.
4. **Stand to one side when starting machine.**
5. Do not grind on side of wheel unless wheel is specifically designed for such use.
6. Do not use excessive pressure while grinding. On surface grinder, do not exceed .0005 inch downfeed at any time.
7. Report to the technician immediately any cracked, broken or otherwise defective wheels.
8. Have the technician mount and balance new wheels.
9. Keep the grinding wheel dressed. Dressing a small amount frequently is better than having to dress a lot later and will allow the wheel to cut faster, cooler and with a better surface finish.
10. Hold work securely while grinding, use the tool rest to support the work when off-hand grinding on bench or pedestal grinders.
11. Do not grind aluminum. Aluminum dust is flammable and explosive. Check with technicians for safety instructions if aluminum must be ground.
12. Wear goggles over safety glasses when grinding on bench or pedestal grinders.
13. If a magnetic chuck is being used on the surface grinder, make sure it is holding the work securely before starting to grind.

Drill Press Safety Rules

Shop staff approval is required before using any drill press equipment.

1. Wear safety eye protection while drilling.
2. Run drill at correct **RPM** for diameter of drill bit and material. Ask technician for the correct **RPM**.
3. **Always** hold work in a vise or clamp to the drill table.
4. Use a correctly ground drill bit for the material being drilled. Technician can help select the correct bit.
5. Use the proper cutting fluid for the material being drilled. Ask the technician about the appropriate fluid for the material you are machining.
6. Remove chips with a brush. **Never** by hand.
7. Ease up on drilling pressure as the drill starts to break through the bottom of the material.
8. Don't use a dull or cracked drill. Inspect the drill before using.
9. Don't drill with too much pressure.
10. Always try to support the part on parallels or a backing board when drilling through material.
11. **Never** place taper shank tools such as large diameter drills or tapered shank reamers in a drill chuck. Only straight shank tools such as standard drills can be clamped in chucks.
12. **Never** try to loosen the drill chuck while the power is on.
13. Always clean drill shank and/or drill sleeve, and spindle hole before direct mounting.
14. Remove taper shank tools from spindle or sleeve with a drill drift and soft hammer.
15. Lower the drill spindle close to the table when releasing the drill chuck or taper shank drill to reduce the chance of damage in the event they fall onto the table.
16. **Never clean the machine while it is in motion.**
17. If the drill binds in a hole, stop the machine and turn the spindle backwards by hand to release the bit.
18. **When drilling a deep hole, withdraw the drill bit frequently to clear chips.**
19. **Always remove** the drill chuck key or the drill drift from the spindle immediately after using.
20. Let the spindle stop of its own accord after turning the power off. Never try to stop the spindle with your hand.
21. Take care in charging the bit or handling drilled materials due to extreme temperatures created in the process.
22. Plexiglass and other brittle plastics can be difficult to drill. Ask the technician for advice on drill and coolant selection when drilling these materials.