

Machine shop safety safety rules

Machine shop working hours: 8:30-12:00 & 1:00-4:30 M-F

Safety must be your primary concern when using the machine shop. Good safety practices will insure a productive and safe project for everyone. The primary safety issues are listed below.

Safety glasses:

Everyone must wear safety glasses anytime you are in the shop. Even if you are not working on a machine, you must wear safety glasses. A chip or shattered cutting tool from a machine someone else is working on could fly into your eye.

Clothes and Hair

Check your clothes and hair before you walk into the shop. In particular:

- If you have long hair or beard, tie it up
- No loose clothing(ties, scarves, long sleeves, etc. are prohibited)
- No gloves
- Remove Jewelry (rings, bracelets, watches, necklaces, etc.)
- **Wear appropriate shoes. NO open toed shoes, sandals or flip-flops.** Wear shoes that give a sure footing.

ONLY ONE PERSON TO OPERATE A MACHINE AT A TIME

Before you start the machine:

- Study the machine. Know which parts move, which are stationary, and which are sharp.
- Double check that your workpiece is securely held.
- Remove the chuck key from the chuck and never leave the wrench on the milling machine drawbar.
- Sufficiently tighten tools and workpieces in vices, holders and chucks.
- Watch for clearances between tools and vises/chucks.

Machining:

- **If you do not know how to do something, ASK!**
- Be aware of what is going on around you at all times.
- Do not hurry. If you catch yourself rushing, slow down.
- Do not rush speeds and feeds(you may damage your part, the tools or the machine itself.)
- Listen to the machine. If something does not sound right, turn the machine off and ask for assistance from main shop staff.
- Do not attempt to measure a part that is moving. **ALWAYS** shut the machine off when measuring your part.
- Remove chips with chip removal tool, pliers or a brush, **NOT YOUR HANDS.**
- Do not leave machines running unattended.
- **Clean up machines after you use them!** A dirty machine is unsafe and uncomfortable to work on.
- Any tool used in your work must be returned to their regular storage locations.
- If a piece of equipment breaks while you are using it, or if there is a problem with the machinery, you must report it to the main shop staff. Do not walk away, there is no penalty for breaking a tool.

Working Protocol

- 1) You must sign in before using a machine and sign out after you are finished.
- 2) Machine shop safety training is mandatory in order to use the shop.
- 3) You must clean the machine using air and/or brushes and wipe down the machine with a rag after each usage. In addition, the floor around the machine must be swept clean. This includes: a) removing all the cuttings, chips and scraps which you create, not just those that are easy to access, b) wiping off the machine table, ways and controls with a paper towel or rag, and c) sweeping the floor in the general area of the machine.
- 4) Any tools used in your work must be returned to their regular storage location. There is a place for everything and everything shall be kept in their place after usage. If a tool is missing from its location, notify the shop staff.
- 5) If your work requires that you remove a vice from the milling bed, then it is your responsibility to return the vice to the cleaned milling bed and make sure it is indicated parallel to the X axis.
- 6) If a machine or tool breaks, report it to the main shop as soon as possible. **DO NOT LEAVE IT FOR THE NEXT PERSON TO DEAL WITH.**
- 7) No student may work alone in the shop. **NO ONE** is allowed to use the lathe or band saw while working alone.

- **Before you start the machine:**

- Study the machine. Know which parts move, which are stationary and which are sharp.
- Double check that your work piece is securely held.
- Remove chuck key from the chuck, and never leave the wrench on the milling machine drawbar.
- Sufficiently tighten tools and work pieces in vices, holders and chucks.
- Watch for clearances between tools and vises/chucks.

- **Machining**

- If you do not know how to do something, **ASK!**
- Be aware of what going on around you
- Do not hurry. If you catch yourself rushing, slow down.
- Do not rush speeds & feeds (you may damage your part, the tools or machinery itself).
- Listen to the machine. If it does not sound right, turn the machine off.
- Do not attempt to measure a part that is moving.

Failure to conform to these safety rules will result in the suspension of machine shop privileges

SAFETY RULES

The machine shop by its very nature is a dangerous environment. Many people have been cut, blinded, paralyzed and even killed in machine shops doing seemingly benign tasks. Safety must be your **primary** concern when using the machines shop. Good safety practices will insure a productive and safe project for everyone. The primary safety issues are listed below. Read and memorize these.

- 1) **WEAR SAFETY GLASSES.** Safety glasses are to be worn anytime you are in the shop. Glasses protect you not only from hazards associated from your work, but also from those of other people in the shop. This is by far the most important safety rule.
- 2) **TIE UP LONG HAIR & LOOSE CLOTHING.** Hair caught in the spindle of rotating machinery has disastrous results. This happens much more often than you think. Always tie up long hair or even a long beard when working in the shop. Also remember to remove jewelry (i.e. rings, necklaces, long dangling earrings, etc) and tie back loose clothing.
- 3) **No long sleeves.** All sleeves must be rolled up above the elbow.
- 4) **Wear proper shoes.** No open toed shoes (sandals/ flip-flops, etc) are allowed in the shop.
- 5) **No food or drink in the shop.**
- 6) **Do not distract anyone who is operating a machine.**
- 7) **Only ONE person allowed to operate a machine at a time**
- 8) **Warn others before making a loud noise.** Using a large hammer and center punch is a typical example.
- 9) **Never walk away from an operating machine**
- 10) **No Child-Like behavior or Horseplay in the Shop**
- 11) **Never leave the chuck key in the chuck.** This rule applies to the drill press, milling machines and lathe. If the chuck key is left in the chuck when the machine is turned on, it is thrown from the machine at a very high speed. Rule of thumb: don't let go of the chuck key unless it is placed safely off to the side of the machine.
- 12) **Never leave the wrench in the milling machine drawbar.** The same logic as rule #11. If it is left on the drawbar, it will become a projectile once the machine is turned on. Again, don't let go of the wrench unless it is sitting on the workbench or its resting place.
- 13) **Sufficiently tighten tools and work pieces in vises, holders and chucks.** Once you place a tool in a holder (e.g. on the lathe) or in a collet (e.g. on the mill or lathe), make sure you tighten it sufficiently. A rapidly spinning tool (with razor sharp edges) which drops out of a holder is a prescription for disaster. Similarly make sure you tighten down your work piece and have it well secured in a vice (e.g. on the mill) or in a chuck or collet (e.g. on the lathe).
- 14) **Watch for clearances between tools and vices/chucks.** Driving a tool into a spinning chuck or spinning tool into a stationary vise will likely cause the tool to shatter, spewing shrapnel over a wide area. Pay special attention to clearance issues. On the lathe, this is particularly important. If operating close to the chuck, check for clearances **with the machine off** by bringing the tool in as

close to the chuck as you will go. Spin the chuck by hand, and check all around the tool and chuck for critical clearances. If it looks close at some point, rearrange your setup so that clearance is not an issue.

A similar problem can happen if too deep a cut is taken in a material. If at the start of a pass, the machine is making excessive noise or vibration, stop immediately and recheck your spindle speed and depth of cut.

Also be observant of any unusual noises which may develop during the course of machining. I.e. a slowly developing screech may indicate a dulling or broken tool bit.

- 15) **Keep your hands far from the blade in the band saw.** More injuries occur on the band saw than perhaps any other machine. This is because your hands are in close proximity to the blade. Always use a piece of wood or metal to push on your work piece. Also, keep your hands to the side of the blade so that if they slip, they don't encounter the table. Do not use excessive force to feed your work into the blade. Do not use your body weight to feed the work.
- 16) **Remove chips with pliers or a brush, NOT your fingers.** This one should be plainly obvious, but nevertheless, this type of injury happens often. In general, keep your hands away from the spinning work piece or tool. It's much harder to lose a finger that way.

In addition, do not remove long strands of material while the machine is running. If such long strands develop, then the chip breaker on the tool is not effective. Stop and regrind the tool.

- 17) **During setup or cleanup, look out for the sharp tool.** The first step in cleanup is to remove the cutting tool. Even if the tool is not moving, its edges are sharp. When you're setting up or cleaning up, your hands are very close to the tool, and if they slip, serious cuts can result. Move the tool away during set up, if possible.
- 18) **All persons wishing to use the student shop must attend the safety lecture and hands on training in the shop.**
- 19) **If you do not know how to do something, just ask!!!**

DRILL PRESS SAFETY RULES

1. Always wear eye protection.
2. If you've never used this machine before, ask for assistance first.
3. Make sure the drill is tight and remove the chuck key immediately. Never leave the chuck key in the drill chuck.
4. Never hold parts in your hands. clamp them to the table or use a vise.
5. Always use the right speed for the diameter of drill and material being drilled. When the motor is off, simply lift the cover and adjust the belt on the pulleys. You want to move the belt to the lower step of the pulley first then adjust the second pulley.
6. Always peck drill to prevent long chips from building up on the drill.
7. Brass, acrylic and other brittle materials are difficult to drill, use the right drill bit for the material to be drilled.
8. Use a sheet metal drill for material that is less than 1/8" thick.
9. Ease up on drilling pressure as the drill starts to break through the bottom of the material.
10. Use a brush or rag to brush chips off, never use your hands.
11. Never use a rag to brush chips off while the machine is running.
12. If the drill binds in the hole, stop the machine and turn the spindle backwards by hand to release the bit.
13. Let the drill press stop on it's own after turning it off. Never stop the spindle with your hand.
14. Never use too much pressure when drilling. The drill may be dull if you have to push hard.
15. Always center drill first before drilling any hole.
16. Clean all drills with a rag and put them in the right place when finished. Always clean the drill press when finished, never clean a machine while it is running.

PEDESTAL GRINDER SAFETY RULES

1. Wear safety goggles or a face shield when using a pedestal or bench grinder.
2. Never wear gloves, a tie, loose clothing, a watch, rings, or jewelry when using a pedestal or bench grinder. Tie long hair back or secure under a cap.
3. Use abrasion wheels that are rated consistent with the speed rating of the pedestal or bench grinder.
4. Only dress abrasion wheels on the face with a diamond dresser.
5. Never use an abrasion wheel that vibrates.
6. Set the work rest no greater than 1/8 inch from the abrasion wheel.
7. Never start the grinder with a workpiece against the abrasion wheel.
8. Only apply the workpiece to the face of the abrasion wheel.
9. ONLY grind steel on the grinder. Do not grind magnesium or aluminum. Fire or explosion may occur. Also, never grind brass, copper, plastics or wood on the grinder.
10. Keep hands and fingers at least two inches from the rotating abrasion wheel.
11. Cool the workpiece by dipping it in water. Do not apply coolant water to the abrasion wheel.
12. Never hand someone a HOT piece that has been ground without cooling in the part in water first.
13. Turn off the pedestal or bench grinder and disconnect the power source prior to making pedestal or bench grinder adjustments or repairs.
14. Clean the pedestal or bench grinder work area upon completion of the grinding task

BAND SAW SAFETY RULES

1. Always wear eye protection.
2. If you've never used this machine before, ask for assistance first.
3. Always make sure the proper pitch blade is on for the thickness of material that is being cut. There should be at least three teeth in the material.
4. When installing a new blade, make sure the teeth are pointing down on the right side of the blade.
5. Always use the right speed for the type and thickness of material that is being cut. The band saw must be running to adjust the speed.
6. The upper guide and guard should be set to within $\frac{1}{4}$ inch of the material.
7. If the blade breaks, immediately turn off the machine and stand back until the machine comes to a stop.
8. Never cut round stock by holding it in your hands. Clamp the part with a vise to prevent the blade from grabbing the part and spinning it out of your hands.
9. Never push on the stock with your hands directly in line with blade, keep your hands to left and right of the blade. Another method is to use a piece of wood to push the stock through the blade to keep your hands and fingers away from the blade.
10. Small parts should be held with a vise to prevent your fingers from coming too close to the blade.
11. Sometimes parts become too hot to hold when cutting. Parts can be held in a vise or run under cold water and blown off with the air hose to cool them down. Never hold a part with a rag while cutting it.
12. Never use a rag to brush chips off the saw while it is running.
13. Always clean the machine when finished.