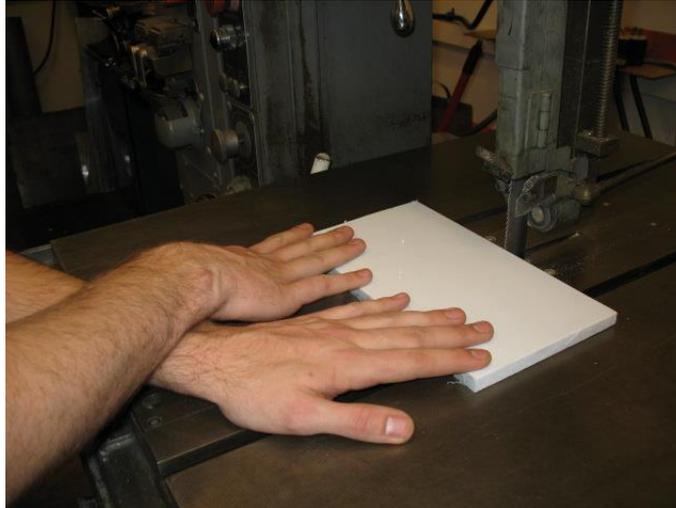


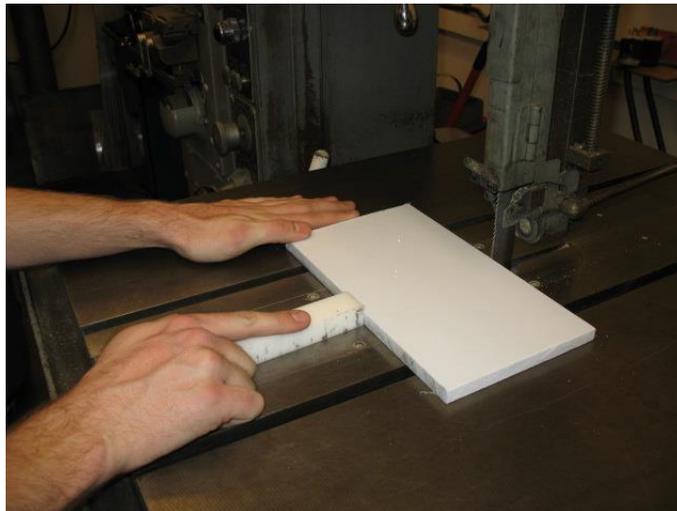
Band Saw Operation & Safety

1. Read and follow GENERAL SAFETY RULES.
2. Three teeth for thickness of material is a good rule to follow when cutting material. Any less and the band saw teeth can be broken off.
3. Read chart on front of band saw and match blade speed with material being cut.
4. Do not become, or let yourself be distracted when using the band saw. Stay focused on what you are doing.
5. Use a sacrifice piece of material or a push stick when pushing material into the saw blade, especially when cutting a small part.
6. Adjust guide so part to be cut just clears under guide.
7. If you have to change blades, turn off master breaker and unplug the saw. Keep personal control of plug so no one else but the person changing blades plugs machine back into receptacle.
8. Do not push material into blade with all your strength. Let the saw blade do the work. A good steady pressure will suffice. As piece being cut nears end of cut, relax your pressure and let the cut finish slowly.
9. Keep hands and arms parallel when you push. Do not cross over, or have any part of your arms or hands in front of blade.
10. When using hydraulic feed on saw, assure part is clamped securely and speed of table is set to minimum to start. As table moves increase speed for optimum cut.
11. If you don't know how to set up the saw for material to be cut, ask, do not guess.
12. Clean machine after use.



DON'T!

Cross your hands over



CORRECT

Use a push stick

Bench Grinders & Sanders Operation & Safety

1. Read and follow GENERAL SAFETY RULES.
2. Do not wear gloves when using bench and pedestal grinders, or abrasive belt sander, or while using a wire wheel. A loose fitting glove can become caught in the spinning abrasive.
3. Assure tool post is set a maximum of 1/8" from wheel face.
4. Wear safety glasses and a face shield when using abrasive wheels.
5. Do not, under any circumstances, grind aluminum or any non-ferrous metal on a bench or pedestal grinder. Use the belt sander. The wheel can become loaded with material and explode.
6. Before starting any grinding, assure there is cooling water available. If the grinder does not have a cooling cup installed, use a paper cup.
7. Assure grinder or sander is unplugged before performing any service.
8. Do not use a damaged abrasive wheel. Replace it or ask the Machinist to replace it. If the grinder has excessive vibration it could mean a damaged wheel.
9. When replacing an abrasive wheel. Hold the new wheel through the mounting hole with one finger and tap the wheel with the knuckles of other hand. The wheel should "Ring". If it does not, do not use it, the wheel could have a fracture that can't be seen.
10. Do not soak an abrasive wheel with coolant. This will cause an imbalance in the wheel and could cause it to fracture.
11. When starting an abrasive wheel, stand to one side, do not stand directly in front of the wheel in case the wheel is damaged and comes apart.
12. Use the truing tool to square the face of the wheel and take out any imbalance. Force tool against wheel lightly and remove as little of the abrasive media as possible.
13. When grinding or sanding make sure object is seated against tool post and held firmly. Use vise grips or pliers on smaller parts. Do not force part into grinder; let the grinding wheel do the work.
14. Clean machine after use.

Lathe Operation & Safety

1. Read and follow GENERAL SAFETY RULES.
2. Wear safety glasses upon entering Shop.
3. Never operate a scroll lathe chuck without a part clamped in it. The jaws can fly out of the chuck.
4. Never reach over a spinning part. Stop rotation then retrieve item.
5. It is always a good idea to "Dry run" a CNC program before any material cutting is performed to assure tool path is correct.
6. Never use your hands or a rag to remove chips, use a brush or pliers.
7. Never leave the key in the chuck. It will become a flying object.
8. Assure all tooling is centered and the cutting bit is not dull, and tool holders are locked into place.
9. Assure part to be machine is secure in chuck.
10. If a part must be de-burred come at it in such a way that you are not reaching over the spinning chuck and be careful not to catch the file in the spinning chuck jaws. Assure that the file you are using has a handle attached. A file with a protruding tang can pierce your hand if caught by chuck.
11. Take note of the emergency stop buttons. Do not hesitate to engage them if you are unsure if tooling is going to contact chuck.
12. If tooling or tool holders are damaged report it to Machinist so they can be replaced or repaired.
13. When using the live center assure tool path clears and does not run into or damage the center.
14. Never touch or try and measure a rotating part.
15. Clean machine and sweep the floor when project is complete.
16. If you don't know, ask. Don't guess.



NEVER leave Chuck Key in Chuck!



DON'T!

Reach over chuck



Correct

Mill Operation & Safety

1. Read and follow GENERAL SAFETY RULES.
2. Keep hand clear of spinning cutters.
3. Never wipe away chips with you hand or a rag. Use a brush.
4. Assure part and tooling are being held securely.
5. It is always a good idea to “Dry run” a CNC program before any material cutting is preformed to assure tool path is correct.
6. Check the “tram” of the vice before machining. If you didn’t install the vice can you guarantee that it is in-line with the axis?
7. Move cutting tooling away from part and stop rotation before reaching in to measure.
8. Assure quill is fully retracted on the Bridgeports before trying to change tooling. The drawbar can become damaged if not fully engaged.
9. Do not over tighten drawbar. The collets are on a taper and self- tightens at a certain point. Over-tightening will cause the auto-drawbar to push the quill away.
10. When the HAAS is going to make a tooling change an audible alarm will sound. Stay away. It will not stop for your hands or your head.
11. Take note of emergency stop buttons.
12. If tooling, cutters and drills become damaged or dull turn them in to the Machinist for replacement.
13. When using an edge finder run it at no more than 500 RPM.
14. Keep clear of axis handles when using Bridgeports in CNC. The spinning knobs hurt if you get in the way.
15. Do not use a milling cutter in a drill chuck. It can and will pull the drill chuck off of the arbor.
16. If you don’t know, ask. Don’t Guess.
17. Clean Machine and sweep the floor when the project is complete.

CNC SAFETY GUIDELINES

1. Follow all General Safety Rules.
2. Read and be aware of the safety warnings posted on the machines or in operations manuals.
3. Let machine and spindle come to a complete stop before reaching in to measure or clean part.
4. Use the proper hand tools for installing and removing tool bits.
5. Avoid unnecessary touching of operator controls while machine is running a program.
6. Know the function of the controls before operating.
7. Make sure the program is written so tooling does not come in contact with vice, fixtures or clamps.
8. Do not overload spindle. Keep it under 100%.
9. If smoke is generated in the machining process, turn on exhaust fan.
10. In case of a crash, report it to a Professor or the Machinist *immediately*. Do not operate machine until the damage has been evaluated and corrected.

Do's and Don'ts

DO get thoroughly familiar with emergency stop buttons.

DO make sure the work is held securely.

DO make sure all tools and machine parts are clear of the cutter before starting machine.

DO keep your hands away from cutters and tool changer.

Do handle cutter carefully

Do keep tools well balanced and arranged in tool holder.

DON'T attempt to operate unless you are familiar with machine.

DON'T push any buttons unless you know exactly what its function is.

DON'T go away and leave the machine running.

DON'T try and operate machines and engage those around you in conversation, or let others distract you. Keep focused and get the job done safely.

Drill Press Operation & Safety

1. Read and follow GENERAL SAFETY RULES.
2. Use a vise or clamp to hold material being drilled. Never try and hold down material with your hand.
3. Assure tool is chucked tightly in drill chuck.
4. Never start drill with Key in chuck. It will become a flying object. Your hand should be on it if it is engaged in chuck
5. Adjust RPM to correct speed for size of tool and material being drilled.
6. Let the tool do the work, Use steady pressure and do not force drill to cut faster than it can.
7. Assure the tool is sharp. A sharp bit is safer than a dull one. Ask Machinist for a new tool or to sharpen the one you are using.
8. Measure the drill bit before use. Just because it came out of a drawer marked for size doesn't mean that the last person using it put it back in the correct drawer.
9. Put drills back in correct location. Think of the next person.
10. Clean the machine after use.



DON'T

Hold material with your hand



CORRECT

Use a clamp

Power Tool Use & Safety

1. Read and follow GENERAL SAFETY RULES.
2. Inspect power cord before use. Assure that the ground lug is in place and the cord is not cut or abraded. On two prong plugs assure that the label specifies that the tool is double insulated.  A symbol of a square within a square, sometimes with a “D” in the center of the squares.
3. Assure all guards are in place. Do not use a hand held grinder without the wheel guard.
4. Assure the casing of the tool is in good shape, without cracks or missing pieces.
5. Never try and use a power tool one handed. Clamp material to a table or sacrifice board and keep both hands on the power tool. Never hold material by hand.
6. Use the right tool for the job. If you can’t find what you need, ask.
7. Think about how you are going to use the tool. Have a plan.
8. Use the tool as it was designed to be used; by one person. If you are using a buddy to hold the material being worked on you might drill, grind or saw them.
9. Adjust blade depth on circular saws to cut just through material. The depth is adjustable, so use it.
10. Inspect extensions cords before use for all lugs and to be free of cuts and abrasions.

Chop Saw Operation & Safety

1. Follow all GENERAL SAFETY RULES.
2. Assure blade is in good working order. No cracks, chips or pieces missing.
3. Inspect power cord for damage.
4. Assure the correct size and type of blade is installed on the saw. (See label on individual saw for information)
5. Unplug saw for blade change or any maintenance.
6. Do not wear gloves when operating saw.
7. Assure guarding is in place and operational. Do not use the saw with guards removed.
8. Assure work piece is secure in the vice. Never hold the work piece by hand.
9. Remove all adjusting tools and keys from saw before operation.
10. Do not cross hands or have any part of your body in front of the blade while cutting. Stand to one side away from direction of rotation incase blade fails.
11. Wait for blade to reach full speed before cutting.
12. Ease blade into part, do not force, let the blade do the work.
13. Do not use any form of lubricant for cutting.
14. Do not cut wood, masonry, stone or ceramics.
15. Do not cut magnesium or magnesium alloys.
16. Cut one work piece at a time.
17. Clean machine after use.

Welding and Cutting Operation & Safety

1. Read and follow GENERAL SAFETY RULES.
2. Inspect welder for cracks, cuts or abrasion in hoses.
3. Inspect power cord for damage.
4. Always wear welding goggles/helmet, welding gloves and a minimum of a long sleeve cotton shirt. (Welding leathers are preferred.) Arc flash burns are very painful.
5. Inspect gauges for damage. Never allow lubrication fluids to come in contact with the oxygen regulator.
6. Never operate Acetylene over 15 PSI. It can auto detonate over this pressure and ***will*** auto detonate at 30 psi.
7. Never use, transport or store bottles in anyway except upright.
8. All bottles; those in use and spares must be in a cart or strapped down to keep from falling over. Spares must have safety cap in place.
9. Remember, all flammable gas has a left handed thread.
10. Remember, on OXY/ACETYLENE, clockwise increases pressure and counter/clockwise decreases pressure on the regulators.
11. When welding or cutting assure hoses are not going to be damaged from the operation. Keep the hoses away from the path of flame or spark.
12. Do not leave welding hoses with pressure. ***Shut off bottles.***
13. Make sure the welder is set up for the work you want to accomplish. Perform a practice bead on like material before welding actual work piece. Running a good bead is mostly in the set-up, technique will come with practice.
14. Clean up when jobs is complete. Leave hoses and cords neat and tidy.
15. Report any damaged or worn equipment so it can be repaired or replaced.

Hand Tool Safety

1. Read and follow GENERAL SAFETY RULES.
2. Tools subject to impact tend to mushroom, (Chisels and Punches). Keep them dressed to avoid flying spalls. Use a tool holder.
3. Do not force tools beyond their capacity or use “cheaters” to increase the capacity.
4. Secure your work in a vice or with clamps. Do not use your hand.
5. Do not use worn or broken tools.
6. Be aware of how you are using wrenches. Use them so you are not in danger of striking you or your hands if the bolt or screw breaks loose or fails suddenly.
7. Ask yourself:
 - a. Is it the right tool for the job?
 - b. Is it in good condition?
 - c. Do you know how to use it correctly?
8. When using an adjustable wrench the force should be applied against the non-movable jaw.
9. If tools are found to be damaged do not use them. Turn them in to a Professors or Machinist for a replacement.
10. Return tools to their proper location, cleaned and ready for the next person.