

- Clean up after yourself after using any public space or machine, including cleaning tables, machines and floor area around it and returning any items to their proper location.
- Do not use a machine if you have not been shown how to operate it safely by the teacher.
- All accidents and safety violations are to be reported to any Officer as soon as possible, within 24 hours at the latest.
- Only use correct tools for your work.
- When carrying tools, sharp edges should be pointed downwards.
- Be patient and do not rush.
- Avoid distractions.
- Don't work on anything when you are angry or upset.
- Only use tools you've been trained and/or approved to work with/on. Ask!
- Familiarize yourself with the location and contents of the first aid station and report any usage or outage of first aid materials.

### **Workshop**

- Avoid working alone in the workshop whenever possible.
- Avoid creating a cluttered work area while working, especially if others are working in the workshop at the same time.
- Be aware when working with long items such as 2x4s as to not hit equipment or people
- When multiple tools are in being utilized on a single workbench, only one tool should be in operation at a time.
- Only one splitter or surge protector per outlet. Do not "daisy chain" them or overload the outlet.

### **Equipment**

- Perform a visual inspection of the tool before using it looking for things like possible damage, missing or loose parts, or the previous user's materials
- Do not use an equipment if it is marked as damaged or appears to be damaged
- Damaged Equipment is to be reported to an officer as soon as possible
- Keep flammable and combustible items away from spark producing activities. Before using a grinder, look to see what is stored around that might respond to a spark. The same with welding or cutting.
- Know where the emergency button is on all tools
- Use of Equipment while intoxicated is grounds for immediate expulsion of the member.
- Misuse of any equipment is to be reported to an Officer as soon as possible

## Metalworking Tools

- **TRUST NO ONE:** Check for yourself if you have the right tools, a solid setup, and the machine is bolted down properly
- HeatSync Training required for use. If you're a pro, you still need to be checked out by an [instructor](#).
- To clean, gently vacuum and/or brush the chips away from the ways. A spotless machine makes setup very easy
- Always wear eye protection and closed-toe shoes.
- Z99 rated industrial quality safety glasses with side-shields. [Tools can throw off sharp, hot metal chips at considerable speed](#) as well as spin off chips of metal that can be quite hazardous. Don't take chances.
- Wear short sleeve shirts, tie back long hair, and remove rings, wrist watches, necklaces, chains and other jewelry.
- Sleeves, hair and jewelry can catch on rotating work and cause [severe injury](#) or [death](#).
- Always double check work areas before starting.
- Make sure your work is [securely clamped](#). Start the tool at low speed and increase the speed gradually. Do not trust that the machine has been set up in a sane way; what if someone removed the spindle and didn't reattach it securely?
- Get in the habit of removing the chuck key immediately after use.
- Some users recommend never removing your hand from the chuck key when it is in the chuck. The chuck key can be a lethal projectile if the lathe is started with the chuck key in the chuck.
- Keep your fingers clear of the rotating work and cutting tools.
- This sounds obvious, but people are often tempted to break away metal spirals as they form at the cutting tool.

## Mill

- Don't over-tighten collet / draw bar.
- There's a point where it's firm and not gripping the endmill getting any tighter, that's good enough.
- Lock the quill at the quill stop before milling - it only should unlock for drilling holes.
- Lock the unused axes so they can't move while cutting
- Use two flute endmills for aluminum, four flute for steel
- Is your endmill center cutting or not?
- Keep chips off the clamping surface, wipe them off with a brush and a rag before clamping.
- Adjust speed and feeds according to tool diameter and material, 300 SFM, .001 IPT for steel, 1000 SFM, .003 IPT for aluminum
- If you think you need coolant, slow down. You can mostly machine dry, unless using tool steel or stainless.
- Start with a DOC (depth of cut) of about 0.025" per pass, if side-milling, start as light as possible
- Remember to account for backlash, check for climb or (preferred) conventional cutting
- You want consistent, sizeable metal chips to be coming off of the tool. Metal powder means you have a dull tool, blue color means slow down your speed (RPM) and feed (cranking the handles). If your aluminum is turning blue, you're doing something wrong
- Sound is important. Aim for a pleasant bassy, sand-like "[bore](#)" sound, not a high-pitched buzz/chatter/whine. If you start cutting and it buzzes or smokes (without lubricant), stop and double-check yourself.
- Use both hands on the feed wheel to get a better feel for the machine and improve steadiness.
- Milling steel takes about 1/3rd the spindle speed of aluminum for the same mill and feedrate.