

# UNIVERSITY OF MINNESOTA SCHOOL OF PHYSICS AND ASTRONOMY STUDENT SHOP HANDBOOK

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## Student Shop Hours

The student machine shop is located in room 24 of Tate Lab. It's available for use by students, staff and faculty of the School of Physics and Astronomy after they have completed the training course and submitted a signed "Student Shop Agreement" form to Jon Kilgore in the main shop (room 30). Once you have completed the training and signed the form, your U Card will be added to the key-card database, which will allow you to access the shop.

### 1) Regular Hours of Operation

Monday – Friday: 6:45 am - 4:30 pm

### 2) Extended Hours:

Monday - Friday: 4:30 pm - 12:00 Midnight

Weekends and University Holidays: 9:00 am - 8:00 pm

During extended hours, a two-person rule is strictly enforced, as described in **General Student Shop Safety Rules & Guidelines**.

## **Shop Safety**

It is imperative that the School's student shop be utilized safely at all times. Use of the student shop is a privilege and anyone that violates the rules will lose shop privileges. A camera is mounted in the shop to monitor usage, verify safe practices and ensure that rules are followed.

A telephone is located on the desk in the student shop. Dial 911 for an emergency. Report any injury to the shop supervisor, Jon Kilgore (Tate Room 30) or to the main office (Tate Room 145) as soon as possible. A First Aid kit, fire blanket and fire extinguisher are located inside the student shop on the hallway wall.

Everyone using the shop is required to read and follow all the safety rules and guidelines listed below. Users are responsible to work in a safe manner for themselves as well as other users in the shop. Come to the main shop and ask for help with any questions or problems.

### **General Student Shop Safety Rules & Guidelines**

1. Use of the shop is allowed only after completing the 8 sessions of required training and submitting the signed "Student Shop Agreement" form on page 10 to Jon Kilgore in the main shop. Once you have completed the training and signed the form, your U Card will be added to the key-card database, which will allow you to access the shop during extended hours.
2. Under no circumstances should you lend your U Card to anyone to allow them to enter the shop without you.
3. During extended hours there must be at least one other responsible adult in the shop with you while you are working. Always having another person in the shop ensures that will have someone to help with an emergency or call for help.
4. Do not work in the shop if you are fatigued or in a hurry, or if you have consumed any alcoholic beverages or drugs that may make you drowsy or affect your judgment.
5. Never rush your work or take chances, and consult the main shop staff as needed for advice on your projects. In particular, extended hour usage is primarily for emergencies or minor repairs. Projects should be started during standard working hours when the main shop is open (M – F, 6:45 am - 4:30 pm).
6. Safety glasses are required in the shop at all times even if you are not operating a machine. Others working in the shop may cause chips, sparks, or shattered cutting tools to be thrown across the room. If hearing protection is needed please come to the main shop for ear plugs.

7. Do not wear loose clothing and always roll up long sleeves. Shoes must be worn in the shop. No sandals or open-toed shoes are allowed.
8. Remove all jewelry, rings, watches, necklaces, headphones, earbuds, gloves, and ties.
9. Always tie back long hair so that it cannot become tangled in a machine.
10. Do not operate any machine unless you are familiar with its operation and have been authorized to use it.
11. If you have any questions regarding machine setup, tooling, speeds, feeds, etc., ask someone in the main shop for assistance.
12. Return all tools, drill bits, cutters, etc. to their proper places when you are done.
13. Clean your machines and work when you are done. Use a brush to wipe off chips, carefully blow off with compressed air, and wipe down with a rag. Machines must be off when cleaning.
14. Long stringy chips are very sharp. Use pliers or hook tool to pull chips off the machine not your hands.
15. Report problems with machines, missing or broken tools to the main shop.
16. Sign out stock and fasteners used on projects on the white slips. Please print clearly and include your EFS budget #.

## **Drill Press Safety Rules**

1. Always wear safety glasses.
2. Use a vise or clamp your work piece to prevent it from spinning if the drill grabs. Never use your hands to hold your work piece.
3. Make sure the drill is tight and aligned in the chuck jaws. Remove the chuck key before turning on the drill. Never leave the key in the drill chuck.
4. Set the drill press for proper speed for the size drill being used and material being drilled.
5. Use a sheet metal drill or Rotex punch if material is less than 1/8".
6. Always peck drill (periodically retract the bit when drilling thicker stock) to prevent long chips from building up on the drill.
7. Use special ground drill bits for brass, copper, and acrylic to prevent the bit from digging into part.
8. Use a brush or compressed air to remove chips. Do not use a rag when the machine is running.
9. Let the spindle coast to a stop on its own after turning off. Never grab the chuck with your hand. Wait until spindle has stopped before making any adjustments.
10. Do not use too much pressure when drilling. Check to see if bit is dull. Use a smaller drill first if a large hole is to be drilled.
11. Clean drill bits and return to proper place in rack. Wipe off drill press table and vise when done.

## **Vertical Band Saw & Horizontal Cutoff Saw Rules**

1. Always wear safety glasses.
2. Use proper speed for material being cut. Low speed for SS, faster for aluminum, wood, copper, and brass.
3. If the work piece gets very hot or you have to push hard the blade is probably dull. Come to main shop to get blade replaced.
4. The upper blade guide should be no more than ¼" above your work piece.
5. If the blade breaks, turn off the machine and come to main shop to get blade replaced.
6. Use a wood stick to push part and keep fingers away from blade.
7. Use a vise to clamp small parts and prevent round stock from spinning.
8. Never use a rag to wipe off chips when machine is running.
9. Hold small parts in a vise.

## **Pedestal Grinder Safety Rules**

1. Always wear safety glasses.
2. Make sure safety shield is in place.
3. Tool rest must be close to wheel without touching (no more than 1/8" gap).
4. Grind only steel. No aluminum, brass, copper, or stainless steel as they will load up the wheel.
5. Grind only on the face of the wheel, not the sides.

## Vertical Milling Machine Safety Rules

1. Always wear safety glasses.
2. Work piece must be clamped securely in a vise or to the mill table.
3. Make sure you are using the proper speeds and feeds for the material and cutter size. Make sure you understand how to switch from high to low range and how to change the v belt on step pulleys.
4. Do not use dull or burned cutting tools.
5. Once tool is clamped into the collet remove drawbar wrench immediately. Do not leave wrench on drawbar nut.
6. Make sure spindle is running in the proper direction. Cutters are right hand. Spindle must rotate clockwise when viewed from the top of machine.
7. Make sure cutter is clear of the part, vise, and your hands before starting spindle.
8. Always stay at the machine when it is running.
9. Make sure cutter is a safe distance away from part when using power feed.
10. Make sure machine has fully stopped before making any measurements, adjustments, or removing part. After spindle is turned off use the brake to stop the spindle.
11. When removing a tool from the spindle fold up a rag and put it on the table under the tool. Hold the brake and loosen the drawbar nut with the wrench 1/2 to 1 turn. Hold the tool with one hand and hit the nut with the brass part of the wrench.
12. Once machine is off and tool is removed clean machine with a brush, compressed air, then wipe off with a rag.

## **Lathe Safety Rules**

1. Always wear safety glasses.
2. Make sure your part is tight in the chuck or collet. Remove chuck key once part is tight.
3. Make sure the cutting tool is sharp and held securely.
4. Clamp tool bit so it extends minimum distance from tool holder to prevent breakage or chattering.
5. Before starting lathe rotate spindle by hand to insure it does not hit tool post, carriage or cutting tool.
6. Use proper spindle speeds and feeds for work material and size.
7. Stop the machine to remove chips from lathe bit or drill bit. Use a pliers or hook tool, not your fingers. Chips are very sharp and hot.
8. Never wipe part off when spindle is turning.
9. When setting automatic feed make sure tool is a safe distance away.
10. File left handed (with both hands) and move tool away from area to be filed.
11. Stop machine before measuring part.
12. Never leave machine when it is running.
13. Always clean machine and remove cutting tools when done. Clean and put away drills and measuring tools. Brush off machine and remove chips from chip pan. Wipe off lathe with rag or Kimwipe.

## **Soldering Safety Rules**

1. Always wear safety glasses. Wear dark safety glasses when hard soldering large joints.
2. Use a spark lighter to light torch.
3. Open gas valve first to light then open air or oxygen.
4. Close gas first to shut off flame then shut off air or oxygen.
5. Red hose is always gas and green hose air or oxygen.
6. Watch where flame is pointed. Keep all flammable materials, cutting oils, solvents etc. off soldering bench and away from open flames.
7. Handle hot parts with pliers.
8. Let part cool slowly. If you plunge it into water you could get burned by the steam.
9. Make sure gas is turned off at torch and at cylinder or inline valve when you are finished.
10. Fire extinguisher is next to door and fire blanket next to soldering bench.

## **Student Shop Agreement**

I have read and agree to follow all the rules and guidelines outlined in the Student Shop Handbook.

I will work in a safe manner for my benefit as well as for others.

This agreement must be renewed every 2 years.

Signed: \_\_\_\_\_

Print name: \_\_\_\_\_

Date: \_\_\_\_\_