Department of
Mechanical & Nuclear Engineering
Student Shop

Introduction to Shop Regulations

PLEASE READ CAREFULLY AS SOME THINGS HAVE CHANGED

I _____, have read and understand the material contained within this document. I understand and agree to follow the MNE Student Shop regulations. I understand that if I choose not to abide by these regulations, I forfeit my privilege to use the MNE Student Shop. I also agree that I will be held accountable for my actions while using the MNE Student Shop.

Phone Number:_____

Email:_____

Club Affiliation (Baja, Formula, Aero):_____

Student signature:_____ Date:_____

Sponsor signature:_____Date:_____

Shop supervisor:_____ Date:_____

Please sign and submit this form to:

Eric Wagner
Mechanical and Nuclear Engineering
Research Technician & Shop Manager
0023 Rathbone Hall
(785) 532-2613
ewagner2@ksu.edu

MNE Student Shop

What is the student shop?

The MNE Student Shop is located in room 0054 of Rathbone Hall. The Shop is provided and supported by the Department of Mechanical and Nuclear Engineering. The Shop supports MNE students in their class work, student organizations, and other MNE affiliated projects. **PERSONAL PROJECTS PROHIBITED** since all the machines were purchased with state funding.

Shop authorization

To be authorized to use the MNE Student Shop you must first read the information provided within this packet. There is a short safety quiz that must be passed with 100% before access will be granted. After reading all of the information and taking the test, you must sign the attached signature sheet. You must also have a sponsor's signature. Your sponsor is the MNE Faculty or Staff member overseeing your work in the Student Shop. By signing and submitting the signature sheet to the Shop Manager in Rathbone 0023, you agree to comply with the rules of the shop and agree to be held accountable for you actions while in the shop.

Sign up procedure

Once you have authorization to use the shop you may request a Student Shop access code from the Shop Manager in Rathbone 0023.

Key codes

After you have received your access code it is your responsibility to remember the code. You will use this code for the rest of the semester. Your key code is not to be shared with anyone unless you are working in a group in which case each group member will be issued the same access code number. If you are issued a group code, use that number for individual shop use as well. If you are working in the shop do not allow unauthorized individuals in to use the shop. If they are authorized to use the shop they will have an access code.

Dress Code

Long pants, closed toed shoes, and safety glasses must be worn at all times. Not cut off shirts allowed.

Questions

Please direct any questions about the Student Shop or the equipment therein to the Shop Manager. Room: RA 0023
Phone: 532-2613 E-mail: ewagner2@ksu.edu

Consequences

Failure to comply with any of the regulations stated in this packet or posted in the shop will result in loss of Student Shop privileges for the individual, your code deleted from the keypad, and notification of your sponsor.

Shop Safety

Before you enter the Shop

- Tie up long hair or beard.
- Remove or rollup any loose clothing (sleeves, scarves, etc.).
- Make sure you have on closed top shoes (No sandals).
- Remove jewelry that could get caught in a machine.
- **Put on safety glasses.**

In the Shop

- Always be alert and make safety a priority.
- Never work alone when using equipment in the shop. Always have someone nearby in case you are injured.
- NO food or drinks allowed in the Student Shop (per KSU lab safety regulations)
- Concentrate on what you're doing. If you get tired, leave and come back later.
- Don't hurry. If you catch yourself rushing, slow down.
- Don't rush speeds and feeds. You'll end up damaging your part, the tools, and maybe the machines.
- Listen to the machine. If something doesn't sound right, turn the machine off and contact the Shop Manager in RA 0023.
- Don't let someone talk you into doing something that you are not comfortable with.
- Don't attempt to measure a part that's moving.
- USE GOOD JUDGEMENT! If it sounds risky it probably is. DON'T DO IT!
- If you have questions or are uncertain about something ask an experienced person to help you. Do not be embarrassed about asking for help. Asking others for help is a great opportunity to learn and become more proficient in the shop.

First Aid

- Always know the location of First Aid and fire extinguishers.
- The first aid kit is located in the cabinet above the sink.
- An eye wash station is located on the wall next to the sink.
- Fire extinguishers are located near the main door and on the column in the center of the room.

In the Event of an Accident

- Treat any wounds with the first aid kit and/or eyewash station.
- Put out any fires.
- Seek medical attention if necessary. Go to the emergency room or call for help if needed.
- Report ALL injuries, no matter how minor, to the Shop Manager in RA 0023 ph: 532-2613.

Oxygen Acetylene Torch

Special Safety

Acetylene will become unstable and spontaneously combust at pressures above 15psi. Never use oil on or near the regulators. If oxygen comes in contact with oil, the oil will combust. Never lay a bottle on its side. This may cause damage to the regulator or internal components of the bottle.

Shaded lens

Always wear welding goggles when using the torch. A lens shade of 3-5 should be used depending on the application.

Changing Bottles

Fuel bottles have left hand threads, oxidizers and inert gases have right hand threads. This is a safety feature to prevent them from being misconnected. If you are not experienced at changing bottles please have an experienced person help you. Use a tag to mark the empty bottles so they can be replaced.

Setting Regulators

The gauge on the right is the tank pressure gauge; it indicates how much gas remains in the tank. The gauge on the left is the output pressure or output flow rate, depending on the application. To adjust gas output turn the regulator knob clockwise for more gas and counter clockwise for less gas.

Changing Tips

Hand tighten only. Do not use a wrench on torch tips. Select the appropriate size for the application.

Lighting Torch

Open oxygen bottle 3-4 turns. Open acetylene bottle only 1-2 turns in case you need to shut fuel off quickly. Turn on acetylene $1/8^{th}$ of a turn at the handle. Light with the striker.

Setting Flame

Once the flame is lit, turn up acetylene and turn up oxygen until a neutral flame is achieved. When the two cones of the flame merge you have a neutral flame.

Metal Inert Gas Welder
(MIG)

Power up

Turn on the power switch and make sure the machine sounds normal. The welder will hum and you will hear the cooling fan. Open the compressed gas bottle.

Set Regulator

Adjust the gas regulator to the correct flow rate for your application. Look it up.

Set Wire Feed

Adjust wire feed rate for your application. Look it up.

Set Voltage

Adjust voltage for your application. Look it up.

Connect Ground

Make sure you have a good ground connection to your part, or weld quality will be affected.

Test Weld

Make a practice weld and adjust gas, wire, and voltage for optimum weld quality.

Changing Spool

Turn off the welder and open the side cover. Hold onto the wire and cut it. Failing to hold on to the wire will allow the spool to come unwound and ruin the spool. Tie the wire to the spool and remove the spool. Pull remaining wire from the gun and lead cable. Install the new spool and cut the wire so you have a straight section of wire to feed through the lead cable. Stretch the cord out as straight as possible. Feed the wire into the cord and clamp the rollers on the wire. Feed the wire into the gun by pulling the trigger. Ask for help if you are not experienced.

Changing Tips

Turn off the welder, remove the gas shield cup and unscrew the tip. Screw in the new tip. Tighten finger tight only.

Changing Bottle

Close the bottle. Remove regulator. Change bottles and reinstall regulator. Mark the empty bottle so it can be replaced. Ask for help if you are not experienced.

Tungsten Inert Gas Welder
(TIG)

Check Electrode

Check to make sure you have the correct electrode for steel or aluminum welding. Use pure tungsten (green) for aluminum welding and thoriated tungsten (red) for steel welding.

Power up

Turn on the power and open the valve 3-4 turns on the gas bottle. The welder should hum and you should hear the cooling fan come on.

Set Regulator

Set the gas flow rate for your application. Look it up.

Set Controls

Set the arc controls (voltage, current, etc.) for your application.

Changing Bottle

Close the bottle. Remove regulator. Change bottles and reinstall regulator. Mark the empty bottle so it can be replaced. Ask for help if you are not experienced.

Please Note: **TIG welding is an advanced welding procedure. If you do not have experience TIG welding, please do not try it without supervision.** Misuse of the TIG welder can damage the machine which will require costly repairs. Your Student Shop privileges will be revoked if you misuse the TIG welder.

Abrasive Cut Off Saw
(Chop Saw)

Check Wheel

Look for damage, nicks or wheel out of round. If the wheel is damaged replace it. Do not operate with a damaged wheel.

Protection

Always wear a face shield and safety glasses, glasses alone are not enough. You may also want to wear ear protection.

Don't Force the Cut

Excessive force will cause the blade to "walk" to one side and could damage the blade. Be firm but not forceful. Let the blade do the cutting.

Material

Steel and Stainless Steel only! No aluminum. Aluminum, wood, and plastic will clog and ruin the blade.

Not a Grinder

Never use the side of the wheel to grind. The wheel can fly apart.

Angle Grinder

Guards

Never remove guards, they are there for your safety. The only time it is acceptable to operate the grinder without the guards is when using a wire cup.

Wheel

Use the correct size wheel and check the wheel for damage. Never use a damaged wheel, it can fly apart.

Material

Unless specified wheels are for steel only. Never use on aluminum it will clog and damage the wheel.

Bench Grinder

Steel Only

Never grind anything but steel or stainless steel on the bench grinder. Never grind aluminum, it will ruin the wheel and can cause it to fly apart.

Stand Away

Always stand to the side of the grinder on startup. This is when the wheel is most likely to fly apart.

Use only the Face

Never grind on the side of the wheel, this will cause premature wear. It can also damage the wheel and cause it to fly apart.

Wheel Dresser

Use the red wheel dresser to square up the face of the wheel before grinding. Ask for help if you are not familiar with the wheel dresser.

Belt Sander

Check for Damage

Look for frayed or torn belt. Replace if necessary.

Grit

Make sure the belt is the correct grit for your application.

Keep Fingers Away

A belt sander can quickly cause injury to the hands and arms. Stay away from the belt.

Don’t Sand in one Spot

This will cause the belt to wear prematurely and can ruin it. Move from side to side and use the whole belt.

Finish tool only

Use the belt sander to clean up edges or to sand lightly. No heavy material removal.

Drill Press

Keep away from the spindle

Tie back long hair. No loose clothing.

No Gloves

Never wear gloves when using the drill press.

Speeds

Use appropriate spindle speeds when drilling. Look it up!

Lubricants

Use cutting oil, fluid or wax. Never use WD-40, it will burn up the bit.

Feed Rate

Excessive force can break the bit. Be firm but not forceful. Let the bit do the work.

Band Saw

Concentrate

A band saw will cut through many materials including your fingers. Pay very close attention to what you are doing. Stop and wait for distractions to pass if needed.

Use Cutting Wax

Use the tube of cutting wax near the saw to lubricate the blade before each use. Turn the saw on and press the wax against each side of the blade for several seconds.

Use Appropriate Speed

Set the blade speed for your application. Look it up. Don't feed the material into the blade too fast, give the blade time to cut.

No Composites

A toothed blade will not cut composite material. It will ruin the blade immediately. An abrasive blade should be used for composites.

Arbor Press

Uses

The arbor press is for light press work. Do not attempt to generate large amounts of torque with this press.

Don't Hammer

Never use a hammer to hit the press, you will only damage the press.

Hydraulic Press

Secure Part

Always make sure your part is on a level flat surface when pressing. Failing to do so could cause severe damage to the part.

High Load

This press is capable of generating very large forces. Use extra caution. This tool can crush fingers and cause damage to parts.

Lathe

Tie Back Long Hair

Keep out of the spindle. Lathe accidents can be fatal. Please use extreme caution when working with the lathe.

Tool Setup

The cutting tip of your tool should be at the center line of the work-piece. Too far above or below will cause poor cut quality and damage the tool.

Use Proper Speeds and Feeds

Use appropriate speed and feed rates for your material. Look it up.

Small Lathe

This is not a big lathe and cannot make heavy cuts. Please use modest cuts when removing material.

Please Note: **<u>If you do not have experience using the lathe please do not try it with out supervision.</u>** Misuse of the lathe can damage the machine which will require costly repairs. Your Student Shop privileges will be revoked if you misuse the lathe.

Milling Machine

Tie Back Long Hair

Keep out of the spindle. Milling Machine accidents can cause serious injury. Please use extreme caution when working with the milling machine.

Tool Change

The drawbar should thread into the collets freely. If the collet binds take the it out and clean the threads. Don't force the drawbar this will ruin the drawbar.

Tightening Collets

Collets do not need to be tightened with extreme torque. A good firm pull on the drawbar wrench will suffice.

Use Proper Speeds and Feeds

Use appropriate speed and feed rates for your material. Look it up.

Please Note: **If you do not have experience using the milling machine please do not try it with out supervision.** Misuse of the milling machine can damage the machine which will require costly repairs. Your Student Shop privileges will be revoked if you misuse the milling machine.

Tool Checkout

Tool Removal

All machines and tools located in the Student Shop are property of the MNE department and **may not be removed** from the shop. This includes ALL tools including, but not limited to: safety glasses, drills, grinders, drill bits, sockets, ratchets, wrenches, taps and dies, hammers, pliers, etc.

Checkout Form

There are certain circumstances such as SAE competitions or Open House when tools may be checked out with prior consent of the MNE Shop Manager and the MNE Department Head.

The tool checkout form is located on the MNE department website and can be located at: http://www.mne.ksu.edu/research/mne-shop/

Cleanup

Clean Your Work Area

Clean the area you used and any areas affected by your work (sawdust, metal chips, etc.).

Check List

The following is a check list of things you should do every time you leave the shop. You need to clean the shop even if you plan to comeback later in the day.

–Return tools to their proper place.
–Sweep off work surface.
–Discard any waste from you work.
–Roll up extension cords, air hose, welder cables, etc.
–Close all drawers and cabinets.
–Put your project away, projects may not be stored in the shop area.
–Turn off any equipment you used.
–Sweep the floor.
–Turn out the lights.
–Check with the Shop Manager if there are any problems

IF YOU DO NOT FOLLOW THE CLEANUP PROCEDURES, YOUR SHOP PRIVILEGES CAN BE REVOKED!

Contact:
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MNE Student Shop Safety

Safety Glasses

- EVERYONE MUST WEAR SAFETY GLASSES IN THE SHOP.
  If you are in the shop you must wear safety glasses. Not operating a machine does not reduce your risk of injury.

Clothes and Hair

- Check your clothes and hair before you enter the shop.
  - LONG HAIR OR LONG BEARD MUST BE TIED UP.
    If your hair is caught in a machine it will pull your hair out if you are lucky. Use your imagination for the unlucky!
  - NO LOOSE CLOTHING
    Ties, scarves and loose clothing are prohibited.
  - NO GLOVES
    Except in the welding area.
  - FOOTWEAR
    No open top shoes (sandals, flip flops, etc.).
  - LONG PANTS
    Long pants are required while working in the machine shop.
  - REMOVE JEWLERY
  - EAR PROTECTION
    Use ear protection when applicable.

Safe Conduct in the Shop

- Be aware of what's going on around you.
- Concentrate on what you're doing. If you get tired, leave.
- Don't hurry. If you catch yourself rushing, slow down.
- Don't rush speeds and feeds. You'll end up damaging your part, the tools, and maybe the machine.
- Listen to the machine. If something doesn't sound right, turn the machine off.
- Don't let someone else talk you into doing something dangerous.
- Don't attempt to measure a part that's moving.

Sign In & Sign Out

- There is a Sign In sheet hanging by the door. Please fill out the information **every time** you wish to use the student shop.
- You need to include the date, time in, your name, your phone number, the tools you used, if you found any broken items, and the time you leave the shop.
- Please report any broken items to the Shop Manager so they can be repaired to prevent further damage or danger for other students.

Using Machines.

- Before you start a machine.
    - Study the machine. Know what parts move, what parts are stationary, what parts are sharp and what parts get hot.
    - Double check that your work piece is securely held.
    - Remove chuck keys and wrenches.
- NEVER LEAVE MACHINE RUNNING UNATTENDED.
- CLEAN UP MACHINE AND AREA WHEN YOU ARE DONE.

  A dirty machine is unsafe and uncomfortable to work on. Do not use compressed air to blow machines clean. This endangers people's eyes and can force dirt into machine bearings.

Failure to follow shop rules and conduct shop business in a professional manner will result in, at least, removal of the violator from the shop for the remainder of the semester. Horseplay will absolutely not be tolerated. Other serious sanctions may be imposed as well.

Please report equipment misuse, broken items, personal misconduct, or any other concerns to Eric Wagner, MNE Department's Research Technician and Shop Manager. Thank you.

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