

# Safety Policy and Machine Shop Rules

## The Engineering Student Design Center

The Engineering Student Design Center (ESDC) consists of 1104 Ghausi Hall, 1231 and 1120 Bainer Hall. The following safety policies and rules must be followed by all users of the ESDC. Violation of any safety policy or rule may result in loss of facility access or other disciplinary action at the discretion of the ESDC Shop Manager.

## The Student Machine Shop Golden Rules

1. **Safety glasses must be worn AT ALL TIMES** in all areas of the ESDC. No exceptions.
2. Only **closed-toed shoes which cover the entire foot** may be worn. No sandals, flip-flops, or ballet flats.
3. **Long pants are always** required. No exposed ankles. Please avoid jeggings/leggings or pajama-like material. Jeans or denim are preferred.
4. At Machines: Long hair must be tied up. Long sleeves must be rolled up.
5. At Machines: No loose clothing. No dangling jewelry. No dangling hoodie strings. No watches. **Please remove them or tie them up.**

## Using the Shop

### Required Safety Training

UC Davis students, faculty, and staff members affiliated with the College of Engineering may only have access to the equipment and tools of the ESDC after successfully completing one of three courses: EME 50, BIM 107, and the Machine Safety Orientation (MSO). These classes cover the essential safety requirements and procedures for handling machines and equipment expected of all ESDC shop users.

Potential shop users participating in these courses are required to attend the *Safety Policy and Shop Rules* lab session. Reasons for missing the first lab session may be presented to the ESDC Shop Manager.

All persons expecting to gain shop access must read, sign, and date the *Safety Record Agreement Form* after reading and understanding the *Safety Policy and Shop Rules* document. This form will be signed and authorized by an ESDC full-time staff member upon completion of the enrolled class. The agreement form is valid for up to 2 years after signing. At the discretion of the ESDC Shop Manager, the shop user's knowledge and skill in the shop may need to be re-assessed after this point.

A safety quiz will be assigned as homework and due the following lab session. This quiz will be collected and graded. A passing score of at least 90% is required. If that is not achieved the first time, then the potential shop user must retake the quiz up to two (2) times until passing. After a third fail, it is at the discretion of the ESDC Shop Manager to decide the next course of action.

Additional training to gain access on machines and/or tools not covered in the EME 50, BIM 107, or MSO classes may be arranged on an individual or as-needed basis. Please speak with an ESDC staff member for more information.

### Hours

Each ESDC room is subject to different hours of operation. 1104 Ghausi is limited to scheduled instructional classes. 1231 Bainer Hall is available by appointment only. 1120 Bainer Hall is accessible during posted operational hours; these hours are subject to change at the discretion of the ESDC shop staff.

Regardless of which room you are occupying, clean-up is 30-minutes before lab ends or 30-minutes before the shop closes. No machines or tools should be used or operated at this time. Plan work accordingly.

All certified and documented shop users are expected to sign in upon entering the shop and to sign out upon exiting or completing work.

## Personal Protection Equipment (PPE)

Minimum Required PPE includes:

1. Safety Glasses
2. Closed-toed shoes
3. Long pants
4. At machines/power tools: Tied back hair. Rolled up sleeves.
5. At machines/power tools: No loose clothing. No jewelry. No dangling hoodie strings.

### Safety Glasses

Eye protection that meets the American National Standards Institute (ANSI) Z-87+ standard must be worn at all times while in the ESDC, except for offices, the restroom, and the washroom. Due to the influence of COVID and its contagious nature, the ESDC cannot provide safety glasses as it has in the past. Users are expected to bring their own pair of safety glasses when visiting any ESDC space.

For people who wear corrective glasses, ANSI approved eye protection must be worn over glasses. Prescription-ground safety lenses may be substituted if they provide equivalent protection and if side shields are firmly attached to the glasses frame.

### Closed-toed shoes

Full-coverage, closed-toe shoes must be worn when in the machine shop. The *entire* foot must be covered.

Thin fabric shoes or ballet flats are not acceptable for working with any machine tool or equipment, hand tool, sheet metal or metal scrap, and welding equipment.

### Long Pants

Long pants must be worn when working with any machines, tools or equipment, sheet metal or metal scraps or while staying in the machine shop for extended periods of time.

All lower body skin must be covered. Chips can easily enter shoes and cut any exposed skin.

### At Machines: Tied back hair. Rolled up sleeves

Long hair must be tied up and not draped over shoulders when using rotating machinery. Loose hair and long sleeves can become easily entangled in the rotating parts.

Excessively long (about 3 inches from the chin) beards must be tied up to keep them away from rotating machine parts.

### At Machines: No loose clothing. No jewelry. No dangling hoodie strings.

Ties, rings, watches, bracelets, unbuttoned long sleeves, dresses, or other loose clothing cannot be worn while operating machinery. Tuck in, roll up, or remove all loose articles of clothing. Loose head wraps should be tucked in under shirt collars or tied back.

Gloves must not be worn when operating any rotating machinery.

However, gloves are recommended for handling sheet metal and sharp tools.

## Additional PPE

- *Clear Face Shields:* Both full-face shields and safety glasses are required for all grinding operations. Full-face shields are provided in the grinding area, the welding area, and the woodshop room.
- *Tinted Face Shields:* Properly tinted face shields will be provided when observing the gas welding processes to protect eyes from the bright light emitted by the flame. Safety glasses must still be worn under the tinted face shield.

## Shop Rules and Guidelines

### General Safety Guidelines and Rules Around Machines

- Do not design or build any type of weapon. Authorities will be contacted if there is any suspicion of weapon building or manufacturing.
- Any project brought into the shop must be academically related.
- If there is any uncertainty on how a tool or machine should be used, do not hesitate to ask an ESDC staff member for help or clarification. It is better to ask for an explanation than it is to take a potential risk.
- Provided machine guards and shields must be in place whenever the machine is operated.
- Turn off machines and wait for any rotating parts to come to a complete stop before reaching in to measure or inspect the part.
- Cutting tools and cut edges are very sharp. Avoid skin contact with mill cutters, metal chips, and metal burrs. Move tools or vises away before reaching in to measure or inspect the part.
- Never leave a machine tool running unattended.
- Always remove the chuck key immediately after use, and place the key in the holder before operating any machinery. Every machine has a designated chuck key holder. Remember the mantra: "The chuck key should be in your hand or in the holder."
- Each machine may only have one operator at a time. There should never be more than one pair of hands touching the machine and its components.
- Headphones, earbuds, AirPods, or the like should not be worn in the machine shop. It is important to be able to hear any announcements or emergency alarms in the shop. Leave these distractions in backpacks.
- All attention must be on the machine tool being used. Do not utilize cellphones, smartphones, or music players while operating a machine. Leave these distractions at the workbenches.
- Ear protection is available for those sensitive to loud machine sounds.
- Machine operators should not be startled while in contact with the machine. Avoid sudden loud noises when others are using machine tools in the same room.
- Machine tools and hand tools that are broken or unsafe should not be used, and should be reported immediately to an ESDC staff member. An ESDC staff member will lock out the machine or tools in need of repair.
- Keep shop rags away from all rotating machinery.
- Wipe up any leaking or spilled oil with a shop rag. Oily shop rags should be disposed in the yellow rags container.
- All machines and the surrounding work area must be thoroughly cleaned and wiped down after use. Floors must be swept. All trash or metal chips must be placed into their respective disposal containers.

- Clean up is 30-minutes before the shop closes. Thoroughly clean and return all tools to their correct places.
- Use a “chicken finger”, a thin piece of wood, to remove any stringy chips from tools. Never use hands or fingers.
- Always keep fingers away from cutting blades. Use a push stick, thick pieces of wood, to push material into cutting blades on vertical band saws or table saws.
- Compressed air is used for cleaning surfaces and parts. It must never be pointed at the body or another person for any reason. Do not use compressed air to blow chips off clothing or out of hair. Each nozzle is equipped with a cone/shield attached to it. If it is missing or broken, please bring it to the attention of an ESDC shop staff and it will be repaired or replaced.
- Ask an ESDC staff member to change chucks on lathes or vises on mills.
- Do not attempt to lift more than 50 lbs unassisted, and ask others to help in lifting any heavy tools, attachments, or equipment.
- Ask a qualified ESDC staff member for help with using the hoist, fork truck, and other lifting devices as needed to prevent back injuries.
- Keep aisles clear of clutter and debris. Avoid tripping hazards. Hang backpacks up on the hooks under the workbenches.
- Electrical panels must be kept clear of obstructions so that emergency personnel can access if needed.
- With the exception of EME 50, BIM 110, and MSO (which all have applicable class fees), do not expect to find free material in the shop. Please bring personal material for future projects.
- Nitrile or latex gloves may be used for handling chemicals. Leather gloves are necessary for welding and handling hot metal. Leather gloves may also be used for handling sheet metal with very sharp edges. However, gloves may not be worn around rotating machinery.
- Safety is everyone’s responsibility. Use common sense to avoid all potential dangers.

## **Chemical Safety**

Safety Data Sheet (SDS) information is stored in the yellow binders located on the south wall, next to the flammable cabinet in 1104 Ghuasi, by the sink in 1231 Bainer Hall, and the northeast corner of 1120 Bainer Hall. Consult the SDS to review the safety precautions of the chemical.

Flammable chemicals must be stored in designated flammable cabinets. Acids, bases, and strong oxidizing chemicals must be stored in segregated cabinets. The ESDC manager must be informed when a new chemical is brought into the ESDC and must be shown a printed copy of the SDS. This copy will be added to the appropriate SDS binder.

Disposable nitrile gloves are effective barriers for most chemicals and can be found in the shop areas.

Cutting fluid, coolant, lubricants, steel blue ink, and diluted cleaning solutions are used specifically in the machine shop areas. Chemical resistant gloves are not needed to handle these items, but are available for use and can be found in the ESDC washroom.

In the event that a chemical makes contact with skin or eyes, eyewash stations and chemical showers can be found in the sink area in 1104 Ghuasi Hall, near the sink in 1231 Bainer Hall, and to the right of the exit door in 1120 Bainer Hall.

Oil spills and splatters must be cleaned up with a shop rag and rags must be disposed in the appropriate yellow rags container. Alert an ESDC staff member when spills are too large to be absorbed by shop rags and the staff member will perform the appropriate chemical spill procedure.

## **Practicing Safety**

All shop rules and regulations must be followed. This includes all published rules in this *Safety Policy and Shop Rules* document as well as any posted signs and warnings around the shop area.

Shop users exhibiting unsafe practices in the shop will be asked to stop working. If the unsafe practices continue, an ESDC staff member may choose to remove the unsafe shop user from the facilities.

In most cases, the first safety infraction will result in a verbal warning, the second in a written warning, and loss of shop privileges will follow a third safety offense.

Again: Safety is everyone's responsibility. Use common sense to avoid all potential dangers.

## **Working Responsibly**

Any disregard for machine protocol resulting in abuse or damage will be cause for disciplinary action.

It is important that you understand how to use the machines properly not only to ensure your safety and any people in the immediate area, but to also protect the functionality of the machines and associated tools for future users.

## Emergencies

### Evacuation

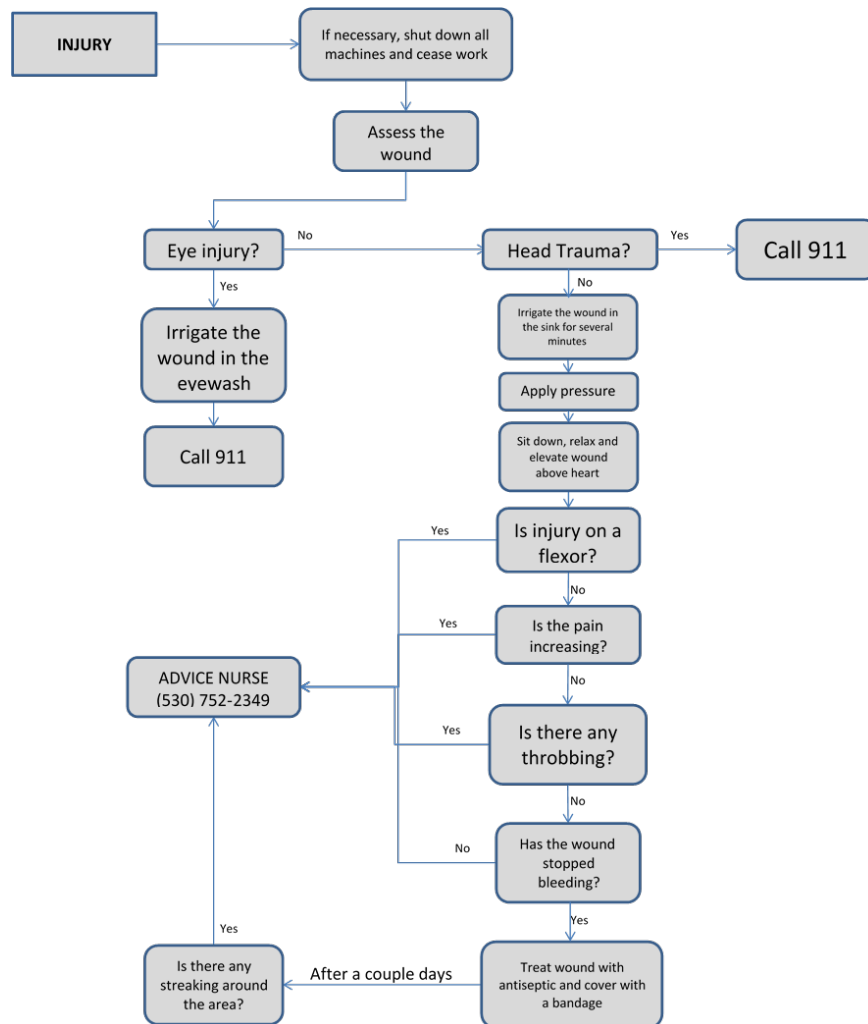
In the event of a fire or building evacuation, everyone must shut down the machines and calmly and safely leave the shop areas immediately. Locate the nearest building exit and follow the directions of the ESDC shop staff/Area Assembly Managers. They will instruct where to meet/gather and when it is safe to re-enter the building.

### In Case of Injury

Injuries must be reported to an ESDC staff member. Anyone who is injured may need to be seen by a medical professional as soon as possible.

For small injuries such as skin cuts or abrasions, a First Aid kit containing bandages and ointment can be found in near the sink area in 1104 Ghausi Hall, near the sink in 1231 Bainer Hall, and next to the doorway in 1120 Bainer Hall. Wash wound with mild soap, dry and stanch the wound, then dress wound with a clean bandage.

Please follow the following chart to access injuries.



**Call 911** for emergency care and transport to Sutter Davis Hospital. Reference the charts below in the case of a non-emergency.

<b>Non-Emergency, but needs medical attention</b>		
	<i>Normal Hours</i>	<i>After Hours</i>
<i>Student</i>	Student Health	Sutter Urgent Care
<i>Employee</i>	Occupational Health	Sutter Urgent Care

### Treatment Facilities

<b>Sutter Urgent Care</b>	
2020 Sutter Place, #101, Davis, CA 95616	
Covell Blvd, cross Hwy 113, turn right at Riesling Court	
(530) 750-5830 (phones open at 5 PM)	
Weekdays	5:30 PM – 9:30 PM
Weekends/Holidays	10 AM – 5:30 PM

<b>Student Health and Counseling Services</b>	
Located on campus	
La Rue Road between Hutchison Drive and Orchard Road, across the street from the Activities and Recreation Center (ARC) and next to the Colleges at La Rue.	
(530) 752-2300	
M,T,TH,F	8 AM – 5:30 PM
W	9 AM – 5:30 PM

<b>Sutter Emergency Department</b>	
2000 Sutter Pl, Davis, CA 95616	
Covell Blvd, cross Hwy 113, turn right at Riesling Court	
(530) 757-5111	
24 hrs/day	

<b>Occupational Health Clinic</b>	
Located on campus	
Cowell Hall on California Ave Call before walking over	
(530) 752-6051	
M,T,TH,F	8 AM – 5 PM
W	9 AM – 5PM



**Safety Record Agreement Form**

All ESDC users must complete and sign this form. The ESDC staff will keep this form on file.

See reverse for record of tool authorization and course completions.

**Name:** \_\_\_\_\_ **UCD Email:** \_\_\_\_\_  
**Dept.:** \_\_\_\_\_ **Major:** \_\_\_\_\_

<b>I am a/an:</b>	<input type="checkbox"/> <b>Undergraduate</b> Expected graduation: _____	<input type="checkbox"/> <b>Faculty or Staff</b>
	<input type="checkbox"/> <b>Graduate</b> Year entered: _____	<input type="checkbox"/> <b>Other:</b>
<b>Training:</b>	<input type="checkbox"/> <b>EME 50</b>	<input type="checkbox"/> <b>Machine Safety Orientation</b>
	<input type="checkbox"/> <b>BIM 110</b>	<input type="checkbox"/> <b>Other</b> Specify: _____

**Principle Investigator  
(if applicable):** \_\_\_\_\_

I have read the shop Safety Policy and Rules, and understand them as they apply to my work in the ESDC shop areas. Specifically:

1. I agree to abide by the published and posted regulations and accept personal responsibility for my work and actions in the shop. I will abide by any and all additional shop rules. I understand that my failure to do so may result in my loss of privileges in the shop areas.
2. I understand the shop access rules, supervision requirements, and shop hours.
3. I will wear safety glasses at all times while in the shop.
4. I understand that the minimum Personal Protection Equipment (PPE) required to work in the shop is safety glasses, closed toed shoes, long pants, tied up hair, and no jewelry or loose clothing.
5. After use, I will thoroughly clean and maintain all equipment, floors, and workbench space I use. I will begin clean-up 30 minutes before closing or before my lab session ends.
6. I will not attempt to use any machine, tool, or equipment that I do not have written permission to use. I will ask for instruction and/or training before using any machine, tool, or equipment with which I am not familiar.
7. For any equipment or tooling I damage, I will promptly notify an ESDC staff member and I will leave my name and contact information (phone number or email address) where I can be reached.

I understand that it is a privilege and learning opportunity to use the ESDC facilities and agree to abide by all University regulations and stipulations placed upon me as conditions for working in these areas. I understand that this agreement may need to be reviewed after 2 years upon signing and dating.

Signature \_\_\_\_\_

Date \_\_\_\_\_

**Tools and equipment authorization**

Date	Approved by	
_____	_____	EME 50 covers items A-K
_____	_____	BIM 110 covers items A-J & L
_____	_____	Machine Safety Orientation covers items A-I

Date	Approved by	Date	Approved by
_____	A. SDS Location	_____	Vertical Band Saws
_____	B. Eyewash, Shower, First Aid Location	_____	Rotex Punch
_____	C. Marvel Saw	_____	Metal Break
_____	D. Upright Mills	_____	Metal Shears
_____	E. Lathes	_____	Manual Slip Roller
_____	F. Drill Press	_____	Tube Bender
_____	G. Belt Sander	_____	Tube Notcher
_____	H. De-burring Wheel	_____	Hydraulic Press
_____	I. Precision Tools	_____	Grinders
_____	J. Tumblers	_____	Wire Wheel
_____	K. Arbor Press	_____	
_____	L. Trotec Laser Cutter	_____	Plasma Cutter
_____		_____	MIG/TIG Welding
_____	Woodshop Band Saw	_____	Gas Welding
_____	Wood Miter Saw	_____	
_____	Wood Belt Sander	_____	3D Printers
_____	Wood Planer	_____	FARO Arm
_____	SawStop Table saw	_____	ShopBot
_____		_____	CNC Lathe
_____	Rotary Power Tools	_____	CNC 3-Axis Mill
_____		_____	CNC 5-Axis Mill
_____	Soldering Station	_____	OMax Waterjet
_____	Reflow Oven	_____	
_____	Pick & Place Machine		
_____	PCB Mill		

## SAFETY POLICY AND SHOP RULES QUIZ

Quiz answer sheet is due at beginning of the next lab session. Need at least a 90% to pass.

### Choose the correct answer

1. Regarding safety glasses:
  - a. They are no longer provided by the ESDC
  - b. They are required in all ESDC spaces
  - c. Users are expected to bring their own
  - d. All of the above
2. Safety Data Sheets (SDS) are located
  - a. On the south wall of 1104 Ghausi Hall
  - b. Near the sink in 1231 Bainer Hall
  - c. In the northeast corner of 1120 Bainer Hall
  - d. All of the above
3. Disposable nitrile gloves are sufficient protection for
  - a. Most chemicals found in the ESDC
  - b. Rotating machinery
  - c. Handling sheet metal
  - d. Welding
  - e. All of the above
4. You may use any machine tool or welding equipment
  - a. After safety training on that machine has been completed and documented
  - b. If you are part of a student team
  - c. If you have prior experience
5. You may leave a machine tool running unattended
  - a. True
  - b. False
6. \_\_\_\_\_ may change a lathe chuck
  - a. Anyone
  - b. Any ESDC staff member
  - c. Only the ESDC Shop Manager
7. In case of evacuation,
  - a. Shut down your machine
  - b. Follow the directions of the ESDC staff
  - c. Go to your car
  - d. Both A and B
8. Any injury must be reported immediately to
  - a. Only the ESDC Manager
  - b. Other shop users
  - c. No one
  - d. Any ESDC staff member

9. The Machine Shop Golden rules include
- a. Tied up hair
  - b. Safety glasses at all times in the shop
  - c. No jewelry while running machines
  - d. Closed toed shoes
  - e. Long pants
  - f. All of the above
10. When welding \_\_\_\_\_ must be worn
- a. Welding mask/helmet
  - b. Welding jacket
  - c. Safety glasses
  - d. Leather gloves
  - e. All of the above
11. Loose or baggie clothing, jewelry, and untied long hair are not permitted while working in the lab because
- a. They may become entangled in rotating machinery and ripped or torn
  - b. They may be caught in machinery and cause extreme injury
  - c. They may obstruct vision
  - d. All of the above
12. Safety glasses are always required in the machine shop. This is because you may be injured or blinded by
- a. Chips from your machine
  - b. Chips from other user's machine
  - c. Pieces of broken cutting tools
  - d. Air blasted dirt
  - e. All of the above
13. Chuck keys should never be left in the chuck because
- a. You may forget to remove it before turning on the spindle
  - b. It should be either in your hand or in its holder
  - c. All of the above
  - d. None of the above
14. Stringy chips wrapped around a tool should be removed
- a. Using a "chicken finger" or thin wooden stick
  - b. With your bare hands
  - c. With a rag while the spindle is on
  - d. None of the above
15. You should always be careful of sharp edges and burrs (rough edges) because
- a. They can cut the skin easily
  - b. They are hard to see sometimes
  - c. They can cause incorrect measurement readings
  - d. All of the above

16. Clean up is 30 minutes before the end of lab or before the shop closes. Clean up includes
- Wiping down the machines
  - Sweeping the floors
  - Cleaning and putting tools away
  - Throwing away metal trash and normal trash
  - All of the above
17. Machine guards must be in place when operating a machine because
- It protects you from flying chips and debris
  - It protects your neighbors from flying chips and debris
  - It helps to contain the mess caused by flying chips and debris
  - All of the above
18. Handle cutters with care because
- Cutters can cut metal therefore they can cut skin
  - They may be filled with oil and chips
  - All of the above
19. If a tool is broken or damaged, alert an ESDC staff member so that
- They can repair or replace the broken tool
  - No one will be injured by a broken tool
  - All of the above
20. It is important to move tools away from the workpiece
- When measuring and inspecting
  - To prevent hands from being cut by stationary tools
  - To prevent tools from crashing when the machine is turned back on
  - All of the above
21. There should only be one operator per machine because
- Someone may become injured if they are not aware of what the other person is doing with the machine
  - The ESDC staff will not be able to tell who is the actual operator
  - There may be confusion over who is doing what
  - All of the above
22. Shop rags must be kept away from rotating machinery because
- They can easily become entangled with a rotating tool
  - A rag caught in a spindle may damage the machinery
  - It will clean the machine
  - Both a and b

23. Clear face shields are necessary for grinding operations because
- a. You want to keep the fine debris away from your face
  - b. The small debris can float into your eyes, nose, or mouth
  - c. Both a and b
24. Ask for help when lifting more than \_\_\_\_\_ lbs.
- a. 10
  - b. 20
  - c. 30
  - d. 50
25. Keep fingers away from cutting edges. If you need to push material into a band saw blade use a
- a. Push stick (thick, wide stick)
  - b. Chicken finger (thin, round stick)
  - c. None of the above
26. When you have open lab access (after completing EME 50, BIM 107, or MSO) you must \_\_\_\_\_ upon entering the shop.
- a. Sign in
  - b. Say hello to the staff
  - c. Turn on a machine
27. If anyone experiences head trauma, you must
- a. Call 911
28. Compressed air
- a. Is used to clean machine surfaces
  - b. Can be aimed at another person
  - c. Can be used to blow chips out of hair
29. Which is/are NOT allowed (select all that apply):
- a. Wearing headphones/earbuds at machines
  - b. Using smartphones or tablets at machines
  - c. Wearing leather/cut resistant gloves to handle sharp material
  - d. Wiping up oil with a shop rag
30. Safety is
- a. Everybody's responsibility
  - b. A state of mind
  - c. Temporary
  - d. Optional
- 31.