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Policy
for

Machine Safety

REVISION

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4	DCN3490	Updates for Nomenclature and branding.	May 2024	G. Matteson	K. Rydberg

Prior revision history, if applicable, is available from the Document Control Office.

1. PURPOSE AND SCOPE

1.1 Purpose

1.1.1 The purpose of this document is to establish the requirements for working with machine tools at the Albany Nanotech Complex (ANC) and was developed in accordance with OSHA 29 CFR 1910.212 General Requirements for All Machines and 1910.215 Abrasive Wheel Machinery.

1.1.2 To ensure that the hazards of the machine tools used at the ANC are evaluated and that the information concerning their hazards is clearly identified and conveyed to those who work with or around these machines.

1.1.3 To ensure that all employees understand the requirements of this policy prior to entering the work area.

1.2 Scope

1.2.1 This policy shall apply to all NY CREATES employees who wish to work in the ANC machine shops (NFN penthouse space). Only NY CREATES employees who are authorized as competent by the area owner are allowed to work in this space.

1.2.2 Any machine shops or areas with machine tools that are present on site shall abide by this policy.

2. DEFINITIONS

2.1 **Machine Tool:** Equipment used to modify materials or devices by removing, adding to, or manipulating that material.

2.2 **Area Owner:** The area owner of the CESTM L126 Workshop is Brian Taylor.

2.3 **Machine Tool User:** Any person using a machine tool. They must be deemed competent by the area owner using Appendix A prior to using any machine tools.

2.4 **Point of Operation:** The area on a machine where work is actually performed upon the material being processed.

3. RESPONSIBILITIES

3.1 Authorized and Competent Machine Users

- Call the area owner with any questions they have, or if they would like additional or refresher training on any piece of equipment.
- Follow all safety procedures listed in this document.
- Check that all guards are functional and in place (where applicable) and that all PPE requirements have been met. Do not remove or defeat guards.

3.2 Area Owner

- Train employees on the proper use of the machine tool
- Document training
- Deem employees as authorized and competent to use the machine tools they were trained on
- Perform periodic inspections / audits per the manufacturers' recommendations (or annually at minimum) of the machine tools for any defects, hazards etc. and to correct any identified issues. **EHS-00077-F1** can be used as a guide for the inspection. Implement engineering controls, including guarding on the machine tools to reduce a hazard in accordance with OSHA 1910.212. The necessity of these implementations will be determined based on the periodic inspections (defined in section 3.3) performed by the area owner. NY CREATES EHS can assist in providing input for these engineering controls.

3.3 NY CREATES EHS

- Provide input for types of controls required to reduce safety and health hazards.

3.4 Oversee the components and audit this program on an annual basis.

4. PROCEDURE

4.1 All machine tools will be stored in locked (lock and key) condition when not in use. The area owner will give out assigned keys only to individuals who are trained and competent. This procedure does not apply to hand tools such as screwdrivers, hammers, etc.

- 4.1.1 The lathe and milling machine will have separate locks from the rest of the machine tools because they are more advanced tools. Keys for these locks must be obtained directly from the area owner and the individuals must receive specific training.
- 4.2 To use a piece of machinery in the workshops, the individual must notify the area owner as to when they will be in the area, for how long, and what they will be working on. This communication system will be used in place of a buddy system and must be followed at all times.
- 4.3 Prior to beginning the work, the machine user should ask themselves the following questions:
- 1) Do I know how to operate this machine tool?
 - 2) What are the potential hazards involved?
 - 3) Are all the guards in place?
 - 4) Are my procedures safe?
 - 5) Am I doing something that I probably should not do?
 - 6) Have I made all the proper adjustments and tightened all locking bolts and clamps?
 - 7) Is the work piece secured properly?
 - 8) Do I have proper safety and personal protective equipment?
 - 9) Where is the Stop Switch/ Emergency Off for the machine tool I am using?
 - 10) Do I think about safety in everything that I do?
- 4.4 At the completion of the work, the machine user must re-lock the equipment, and call the area owner to let them know that their work is complete, and that the equipment is properly locked out.
- 4.5 A hot work procedure has been approved for using the GTAW welding equipment in the CESTM L126 Workshop. If a welder is moved and used in any other location, a hot work permit must be obtained and approved prior to use.
- 4.6 To prevent from being pulled into the machine tool, loose sleeves and clothing should be tied back. Any neck-ties should be removed, and hair should be pulled back. If you wear a shop apron, make sure it is tied behind the body or so strings / ties cannot be caught by the machine tool.
- 4.7 Jewelry should not be worn in the machine tool shop.
- 4.8 No equipment should be left unattended while running.

- 4.9 Any damage to machine tools should be reported to the area owner immediately. Damaged machine tools should be tagged saying “do not use” or something similar.
- 4.9.1 Machine tools must be completely stopped and de-energized before attempting to clear jammed work or debris.

5. RECORD KEEPING

- 5.1 The area owner is responsible for keeping records of who they trained, deemed authorized/competent and gave keys out to. The area owner is also responsible for keeping records of their audits, PM schedules, inspections, etc.

6. PERSONAL PROTECTIVE EQUIPMENT (PPE)

- 6.1 Eye protection is required at all times while working in the machine shops, due to the potential for flying metal and wood chips. Eye protection is available at the entryway to the workshop from the CESTM Corridor. Safety glasses must be ANSI Z-87 approved, see **EHS-00010: Personal Protective Equipment** for more information.
- 6.2 Gloves should be worn during housekeeping activities; however, they are not recommended to be used while working with the machine tools due to the potential for them to get caught in a moving part thus pulling the glove, and possibly a hand, inside the tool.
- 6.2.1 Leather gloves need to be worn while working with the GTAW/GMAW welders. See Appendix A for machine-specific PPE.
- 6.3 Safety shoes with steel toes should be worn while in the machine tool shop. NY CREATES provides safety shoes to qualified personnel based on their job duties; contact your supervisor and EHS to see if you qualify.
- 6.4 Several of the machine tools in the machine tool shop produce excessive noise. Hearing protection should be worn while operating these machines (see Appendix A). Hearing protection (ear bud inserts) are available at the entrance to the machine tool shop.

7. GUARDING

7.1 One or more methods of machine guarding shall be provided to protect the machine tool user and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks, etc. Examples of guarding methods are barrier guards, two-handed tripping devices, electronic safety devices, etc.

7.2 General requirements for machine guards include:

- Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible.
- The guard shall be such that it does not offer an accident hazard in itself.
- The point of operation of machine tools whose operation exposes an employee to injury shall be guarded. The guarding device shall be in conformity with any appropriate standards, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.
- Special hand tools for placing and removing material shall permit easy handling of material, without the machine user placing a hand in the danger zone.
- Point of operation guarding is required for
 - Guillotine cutters
 - Shears
 - Alligator shears
 - Power presses
 - Milling machines
 - Power saws
 - Jointers.
- Guarding for abrasive wheel machinery should abide by OSHA 29 CFR 1910.215.

7.3 Appendix C is a Machine Guarding Reference Guide that can be used to aid in the determination of what guards should be used on a machine tool.

8. HOUSEKEEPING / MAINTENANCE

- 8.1 Power down and lock out (using Lock-Out / Tag-Out procedures) all equipment prior to cleaning and maintenance.
- 8.2 Remove any chips or debris from the machine tools using a brush. Do not put your hands near the point of operation of the machine tool, any power transmission apparatus, or any other major parts. Never use bare hands.
- 8.3 Periodically check the machine tools for any broken wires, loose wires, bent pins or burnt connectors etc. and repair as needed. This should be done per the manufacturers' recommendations, but at least annually.

9. TRAINING

- 9.1 All employees who wish to use machinery must receive appropriate training from the area owner, and document receipt of that training on a sign-in sheet.
- 9.2 Training must be renewed annually, and documentation of training will be maintained by the area owner. Training must also be refreshed when changes in the workplace or type of shop equipment render the previous training obsolete, when the machine tool user has been observed operating equipment in an unsafe manner and/or when the machine tool user has been involved in an accident or near miss.
- 9.3 Training will consist of reviewing all machine tools in the machine shop via the checklist found in Appendix A. At the completion of the training, both the instructor and the student must sign at the bottom of the document.
- 9.4 The following pieces of machinery will all be covered in the initial training:
- Orbital Welder
 - Drill Press
 - Pedestal Grinders
 - Bench Top Grinders
 - Pedestal Buffer
 - Belt Sander & Disc Sander
 - Table Saw
 - Chop Saw
 - Cold Saw
 - Vertical Band Saw
 - Cut Off Saws
 - Bead Blaster
 - Hydraulic Press
 - Arbor Press
 - Hand Punch
 - Sheet Metal Manual Jump Shear
 - Slip Roller
 - Box Pan Brake

9.5 The following pieces of machinery require additional training:

- GTAW / GMAW Welders
- Plasma Cutter
- Lathe
- Milling Machine
- Hydraulic Lift
- Engine Hoist
- Gantry Crane

10. AUDITS

10.1 Audits should be performed per the manufacturers' recommendations, at minimum annually, and any time the machine tool is changed or modified. While performing audits, the area owner should ensure that all guards are in place and functional and check the machine tool for any broken, loose, or damaged parts.

11. APPENDICES / ASSOCIATED DOCUMENTS

11.1 Appendix A - Machine Safety Training Checklist – CESTM L126 Machine Shop

11.2 Appendix B - Types of Machine Tools –CESTM L126Machine Shop

11.3 Appendix C - Machine Guarding Reference Guide

11.4 **EHS-00077-F1** - Machine Shop Safety Inspection Form

APPENDIX A - Machine Safety Training Checklist - CESTM L126

Machine Shop

This training checklist shall be used to train authorized employees on how to properly use machine tools located in the **CESTM L126 Machine Shop**

Machine	PPE	Additional Precautions	Reviewed?	Questions/Comments
Drill Press	Safety Glasses, Steel Toe Boots, Face shield, if necessary*	- Hold the drill by the handle only - Do not use bits longer than those recommended - Never hold work in your hand, lap, or other body part - Clamp work to table	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Pedestal Grinders (2)	Safety Glasses, Hearing protection, Steel Toe Boots, Face shield, if necessary*	- Ensure wheel guards are in place and fastened - Do not operate at speeds higher than what the manufacturer recommends - If the grinding operation is dry, use local exhaust - Stand to the side of the rotation of the wheel	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Belt Sander	Safety Glasses, Steel Toe Boots Hearing protection		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Table Saw	Safety Glasses, Steel Toe Boots Hearing protection		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Chop Saw	Safety Glasses, Steel Toe Boots Hearing protection		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Cut-off Saws (2)	Safety Glasses, Steel Toe Boots		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Bead Blaster	Safety Glasses, Hearing protection		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Hydraulic Press	Safety Glasses, Steel Toe Boots	High pressure	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Arbor Press	Safety Glasses, Steel Toe Boots	Only get as much pressure as you can press	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Sheet Metal Manual Jump Shear	Safety Glasses, Steel Toe Boots	Watch your feet when you step	Yes <input type="checkbox"/> No <input type="checkbox"/>	
*Additional training required on the following:				
GTAW/GMAW Welder	Safety Glasses, Welding Helmet Leather gloves, Welding leathers or equivalent body protection Radiant energy eye protection, - Heat-resistant apron	- Need to have on hot gloves to handle and leather gloves while welding. - Hot work - Local exhaust	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Lathe	Safety Glasses, Steel Toe Boots		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Milling Machine	Safety Glasses, Steel Toe Boots		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Hydraulic Lift	Safety Glasses, Steel Toe Boots Gloves		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Gantry Crane	Safety Glasses, Steel Toe Boots		Yes <input type="checkbox"/> No <input type="checkbox"/>	Reference EHS-00067 for information on crane safety
Orbital Welder	Safety Glasses, Steel Toe Boots		Yes <input type="checkbox"/> No <input type="checkbox"/>	

*Face shield is dependent on amount and size of particles generated

I acknowledge that I have received training on the above pieces of machine tools and take responsibility for my safety and for following the procedures outlined in **EHS-00077: Machine Safety Policy**.

Employee:





Print Name: _____ Signature: _____ Date: _____






Instructor:



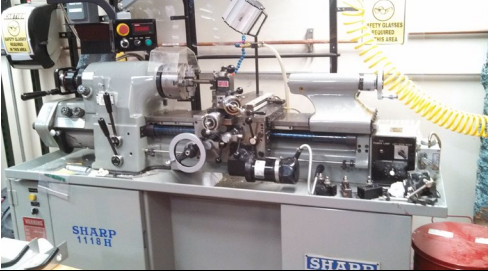


Print Name: _____ Signature: _____ Date: _____

Was the employee issued a personal key? Yes No

APPENDIX B - Types of Machine Tools - CESTM L126 Machine Shop

Type of Machine Tool	Picture	Description
Drill Press		
Pedestal Grinders (2)		<ul style="list-style-type: none"> -The gap between the grinder and the platform must be 1/8" or less - The gap between the wheel periphery and the tongue must never exceed 1/4"
Belt Sander		
Table Saw		

Chop Saw		
Cut-off Saws (2)		
Bead Blaster		
Hydraulic Press		
Arbor Press		

Sheet Metal Manual Jump Shear		
GTAW/GMAW Welder		
Lathe		
Milling Machine		
Hydraulic Lift		

Gantry Crane		
Orbital Welder		

APPENDIX C - Machine Guarding Reference Guide

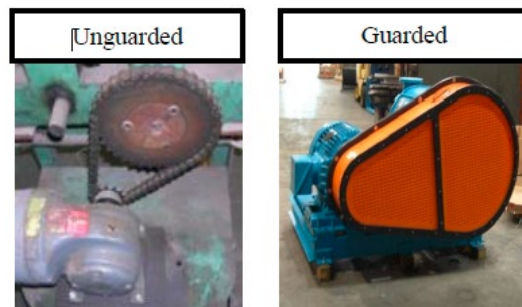
The following are general guidelines regarding machine guarding. In many cases, there is more than one way to achieve proper machine guarding.

- This is not intended to be an all-inclusive list of shop equipment.
- Consult with NY CREATES EHS and/or the equipment manufacturer for additional machine guarding information.
- The following guidelines were taken from The Pennsylvania State University Machine Shop Safety Program

Guarding Requirements for All Shop Equipment

The following points must be adequately guarded on all types of shop equipment:

- Point of operation: Area where the machine performs work. An example would be where a saw blade meets the material being cut.
- Power transmission devices: Elements of the mechanical system that transmits energy. Examples would include flywheels, belts, chains, and pulleys.
- Other moving parts: Other parts of the machine that move when the machine is in cycle.



Bench Grinder

Guarding Requirements:

- Adjustable tongue guard 1/4" from wheel.
- Adjustable work rest 1/8" from wheel.
- Bench grinder needs to be secured to the work surface.
- The required guarding for a wire brush attachment is a tongue guard. (A tool rest is not recommended in this situation).

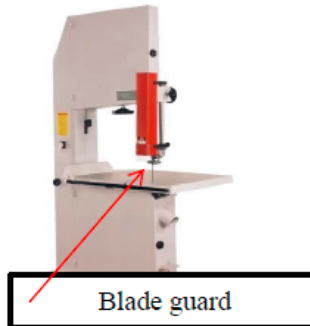
Safe Work Practices:

- A grinding wheel must be dressed to prevent a ridge from forming.
- Perform a ring test before mounting an abrasive wheel.
 - The abrasive wheel must not be used if a dull sound is noted.
- If the grinding wheel is cracked, do not use it because it could shatter.

Band Saw

Guarding Requirements:

- Adjustable guard. Set the guard as close as possible to the stock.



Milling Machine

Guarding Requirements:

- Point of operation guard.

Belt/Disc Sander

Guarding Requirements:

- Fixed guards at pinch and nip points.



Angle Grinders

Guarding Requirements:

- A fixed guard must be on the grinding wheel enclosing one-half or 180° of the grinding wheel.

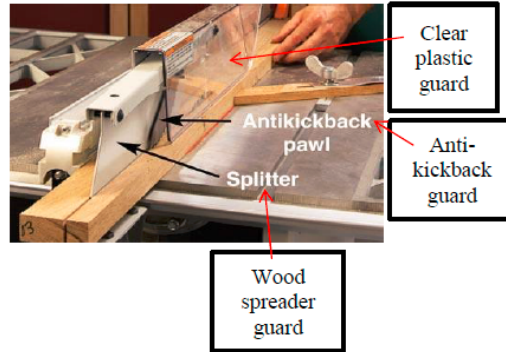
Table Saw

Guarding Requirements:

- There are three guards needed on a table saw: a wood spreading guard, anti-kickback guard and a self-adjusting guard over the blade.

Safe Work Practices:

- A push stick must be used when the stock being cut is small.
- The top of the teeth of the table saw blade shall not extend $\frac{1}{4}$ " above the material being cut.

**Saw Stop – Table Saw****Guarding Requirements:**

- The guarding requirements for a “Saw Stop” table saw are the same as those for a standard table saw.

Radial Arm Saw**Guarding Requirements:**

- A self-adjusting guard below the blade

Safe Work Practices:

- The radial arm saw must be returned to the original position after a cut is finished.
- Saw should only be used for cross cutting. A table saw is a better tool for ripping.

**Jointer (Manual)****Guarding Requirements:**

- Self-adjusting blade guard.

Safe Work Practices

- If the wood stock is small, use a push stick to feed the stock.

Planer / Molder (Automatic)

Guarding Requirements:

- Cutter heads must be completely enclosed, except for the opening needed to feed the stock into the tool.

Circular Saw

Guarding Requirements:

- Self-adjusting blade guard.

Safe Work Practices:

- If the saw cut is stopped before the cut is finished, the saw must be turned off before being removed. If the saw is pulled out before stopping, kickback could occur.

Routers

Guarding Requirements:

- Self-adjusting guard above cutting bit on bench version. Fixed guard on handheld version.

Welding and Brazing

PPE:

- Fire resistance clothing
 - Coat
 - Pants
- Welding helmet or tinted face shield
 - Tinted number depends on what type of welding or torch is being used.
 - If a face shield is used, safety glasses are required.
- Leather gloves
 - Heat resistant
 - Respiratory Protection (site specific)

Safe Work Practices:

- Oxygen and acetylene cylinders must be secured to a cart by using chain or webbing strap.
- If a cylinder does not have a regulator attached, it must be capped.
- Inspect work area for any combustibles.

Chop/Miter Saws

Guarding Requirements:

- Both saws must have self-adjusting blade guards.

Safe Work Practices:

- Only use the recommended blade based on size and revolutions per minute (RPM).

Reciprocating Saw**Guarding Requirements:**

- Must be equipped with hand/finger guard.

Jig Saw**Guarding Requirements:**

- The upper portion of the blade, above the tool rest, must be guarded.

Scroll Saw**Guarding Requirements:**

- Blade guard

Power Press Brake**Guarding Requirements:**

Note: There are many different methods which can be used to effectively guard this equipment. They are listed below. The best means of guarding will depend on how the press brake is used.

- Moveable barrier guards
- Fixed guards
- Presence-sensing devices
- Pull back devices
- Restraint devices
- Two-hand trip devices

Power Shear**Guarding Requirements:**

- Adjustable guard

Power Press (Mechanical and Hydraulic; Part Revolution and Full Revolution)

Guarding Requirements:

Note: Depending on the size and type of power press a variety of guarding methods are available. The following are examples of such methods. Contact NY CREATES EHS or the equipment manufacturer for consultation.

- Point of operation guard
- Pull back device
- Restraint device
- Gate type guards (A and B types)
- Two-hand trip
- Two-hand control
- Presence-sensing device

Safe Work Practices:

- Operators must never place their hands in the die area (point of operation) while performing normal production operations.
- Hand tools designed for freeing or removing work or scrap pieces from the die must be used.
- OSHA has a specific standard on Mechanical Power Presses. (CFR 1910.217 – Mechanical Power Presses)

Lathe (Automatic and Manual) (Wood and Metal) Guarding Requirements:

- A guard over the chuck.
- For lathes used for turning long stock, a guard over top of the stock.

Safe Work Practices:

- Tie back hair and no loose clothing so it does not get caught on the spinning chuck.
- After adjusting the machine, remove the chuck key.

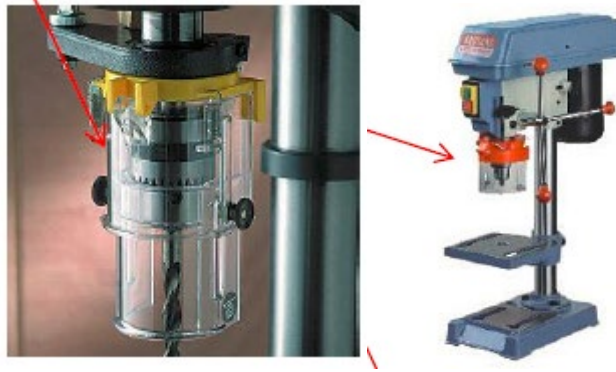
Drill Press

Guarding Requirements:

- Chuck guard

Safe Work Practices:

- Small material being cut shall be clamped to prevent any spinning.
- The drill press machine must be secured so it will not “walk.”



Milling Machine

Guarding Requirements:

- Adjustable or permanent chip / coolant shield.

Safe Work Practices:

- Tie back hair and no loose clothing so it does not get caught on the spinning chuck.
- Do not allow large quantities of chips to accumulate around the work piece or machine table.

Compressed Air Tools

Guarding Requirements:

- Safety tips must be installed to relieve air pressure in the event the nozzle is “dead-ended.”
- Air pressure must be less than 30 PSI when using compressed air for cleaning.

Safe Work Practices:

- Compressed air tools shall never be used to remove dirt from clothing or skin.