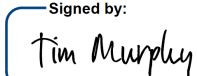




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nationalmaglab.org

National High Magnetic Field Laboratory Safety Program

TITLE: Machine Shop Safety Program	SUBJECT: Identifies the specific requirements for the protection of NHMFL personnel working on rotating cutting tools, work pieces and machining tools.
PROGRAM NUMBER: SP-32	EFFECTIVE DATE: 3/02/2017
REVISION NUMBER: 003	REVISION DATE: 7/31/2024
ISSUING AUTHORITY: Safety and Admin	REVIEW DATE: 8/01/2024
Additional Approval Signatures on Revision and Approval Page in Appendix	APPROVAL: NHMFL Deputy Lab Director  <small>Signed by: EEC858BD1BAA403...</small>

Overall Mission and Overview:

The National High Magnetic Field Laboratory (NHMFL) Environmental, Health, and Safety (EHS) program's mission is to:

Provide support and guidance to all NHMFL departments with the implementation, maintenance and review of a comprehensive environmental, health, and safety program. The primary goal of the NHMFL EHS program is to control, reduce or eliminate work-related injuries, illnesses and loss of NHMFL resources.

The NHMFL is charged by the National Science Foundation (NSF) to safely:

- Promote magnet-related research to serve an interdisciplinary scientific user community.
- Provide unique high-magnetic-field facilities through a competitive and transparent proposal review process.
- Advance magnet and magnet-related technology.
- Partner with universities, other national laboratories and industry to enhance national competitiveness in magnet and related technologies.
- Serve the NSF as a prominent example of its successful stewardship of large research facilities.
- Support science and technology education in the United States.
- Increase diversity in the science, technology, engineering, and mathematics workforce
- Promote collaboration among our three partner institutions: Florida State University (FSU), the University of Florida (UF) and Los Alamos National Laboratory (LANL).



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1.0 PURPOSE

It is the intent of the NHMFL to provide every employee, user and visitor with a safe and healthful working environment. The purpose of this program is to ensure that all employees, users or visitors are properly trained before utilizing machines that are commonly found in machine shops and other locations throughout the lab.

2.0 SCOPE

This program is to be used by all NHMFL personnel operating machining equipment/power tools.

This program identifies the specific requirements for the protection of personnel working on facility machinery from hazards of rotating cutting tools, work pieces, energized equipment and accidental release of stored or potential energy.

This program establishes responsibilities as applicable for the administration and implementation of the program.

All personnel who work within a machine shop or with machining equipment / power tools are required to be familiar with this program. However, knowledge in the specifics of this procedure does not make a person qualified to work on all equipment. Work practices shall be established at each work area and for each job task, which include specific machine shop safety concerns and activities.

3.0 DEFINITIONS

Level I User: A machine tool operator trained on a specific tool located in the machine shop. They are primarily lab and facility personnel with limited formal machining training.

Level I-A User: A machine tool operator trained on a specific tool located in the research groups lab, not the machine shop. They are laboratory personnel with limited formal machining training.

Level II User: A machine tool operator trained on a specific tool located in the machine shop. They are primarily lab and facility personnel that has Level I and II training.

Level III User: A machine tool operator trained on a specific tool located in the machine shop. They are primarily lab and facility personnel that has Level I and II training (or demonstrated equivalent proficiency) and reflects extensive machining experience and training for a non-professional machinist.

Level III-A User: A machine tool operator trained on a specific tool located in the research groups lab, not the machine shop. They are primarily lab and facility personnel that demonstrate proficiency on a specific fixed machine tool. A Level III-A User will have had extensive machining experience and training for a non-professional machinist.

Level I-A machining equipment: Band Saw, Cutoff Saw, Drill Press, Shear Media Blaster, Brake, Belt Sander, Polishing and Wire Wheels, Flap Wheels



Machine Shop: Any area that contains a fixed machining tool.

Machining equipment / power tools: Are machines for shaping or machining metal or other rigid materials, usually by cutting, boring, grinding, shearing, or other forms of deformation. They can be either fixed in place (machine tool) or portable (hand tool).

Machine Shop Manager: Person responsible to supervise, plan, train and coordinate fabrication and assembly for the NHMFL and ASC main machine shop.

Machine Shop Supervisor: Machine shop manager designee responsible for first-line management for the machine shop, machinists and associated activities.

Shop Supervisor (NHMFL Laboratories and Facilities): Principal Investigators, Lab Managers and Facility supervisors with authority and control of machining equipment or power tools.

Professional Machinist: A skilled machine tool operator with several years of experience starting at the apprenticeship level; with continuous formal training; continuous on the job training and working full-time in a specialized area in the machining industry.

NC Machine: NC (Numerical Control) refers to the automation of machine tools that are operated by computer generated code.

Safety Data Sheets (SDS): SDS is a document that contains information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with a hazardous material.

Task Hazard Analysis (THA): The purpose of the Task Hazard Analysis is to identify hazards and safety controls associated with a job activity and to assess a residual risk level.

4.0 RESPONSIBILITIES

4.1 SHOP, RESEARCH LAB, AND FACILITY SUPERVISORS

Shop, Research Lab and Facility supervisors with authority and control of machining equipment/power tools shall:

- Not allow the authorized use of machine equipment in labs or shops under their authority without providing adequate training on the safe use and operation of machining equipment / power tools.
- Verify competency for any person -- that they do not directly supervise -- requesting permission to use a specific machine tool under their control.
- Control the use of machining equipment / power tools.

Examples of controlled use:

1. Machine tool is located behind a locked door controlled by supervisor
2. Machine tool is in a locked cabinet or storage area controlled by supervisor
3. Machine tool requires a passcode for operation
4. Machine tool power on/off is key controlled by supervisor



5. Machine tool power is physically key controlled by supervisor

- Ensure that only trained personnel operate the machining equipment / power tools.
- Ensure that machining equipment / power tools are both maintained and are in good condition.
- Ensure that all persons operating the equipment wear appropriate personnel protective equipment.
- Ensure that all persons working with machining equipment / power tools follow appropriate safety procedures.

4.2 USERS

The users of machining equipment/power tools shall:

- Operate each machine tool according to the safety specific procedure.
- Follow the instruction of the supervisor or trainer.
- Inspect equipment for defects prior to use.
- Report any defects in any part of the equipment.
- Wear appropriate personnel protective equipment.
- Report all injuries to the supervisor and safety department.
- Keep the work area clean.

4.3 SAFETY DEPARTMENT

The Safety Department shall:

- Control access and security to the machine shops.
- Ensure that the appropriate personal protective equipment is available.
- Maintain training records.
- Evaluate and update training and procedures as needed.

5.0 GENERAL SAFETY GUIDELINES

All mechanical motion is potentially hazardous. Rotating devices, cutting or shearing blades, nip points, reciprocating parts, linear moving belts and pulleys and uncontrolled movement of falling parts, are examples of motion hazards. Personnel working with machining equipment or in areas where they are exposed to machinery or equipment hazards must be aware of the potential for accidents.

The following guidelines must be followed when working in a machine shop or with machining equipment:

- Eye protection must be worn at all times.
- Hearing protection must be worn when excessive noise levels are present.



- Open toed footwear must never be worn a machine shop or when working with machining equipment.
- Loose clothing, long hair, dangling accessories, jewelry or other similar items that could catch in the moving parts of a machine, must not be worn while working with the machines unless they are so tied, covered or otherwise secured as to prevent an entanglement hazard.
- Gloves should not be worn around machines with rotating parts. If gloves must be used to avoid injury while handling sharp parts, great care should be exercised to ensure that gloved hands do not get near rotating parts or cutters.
- Integrated Safety Management must be used to evaluate tasks and determine the risk before proceeding with any work. Some tasks and some machines will require a second worker to be present.
- Tools shall only be used for their designated purpose. A tool or an attachment shall not be used for something it was not designed for.
- The tools should always be operated at the correct speed for the job at hand.
- All guards should be kept in place. Under no circumstance shall the manufacturer installed guards be removed from a machine. If a task requires removal of an aftermarket guard, a task hazard analysis shall be used to evaluate the job and the Shop supervisor or the person with authority and control of the machine must approve of the removal. EHS must also be notified before the guard is removed.
- Machines and tools shall be properly maintained.
- Any machine at risk for tipping shall be securely anchored to prevent movement.
- Damaged tools and machines shall be reported to the person in charge of the machine shop or the person responsible for the equipment. Defective tools or machines must not be used and shall be tagged out and made inoperable.
- A person shall not engage in horseplay while operating a machine.
- The operator of a manual machine must watch the work while operating a machine. The operator must be free of distractions during the machine operation.
- Power shall be disconnected or turned off before changing components or clearing jams. Machinists shall follow the NHMFL Lock/Tag/Verify procedure before repair.
- No person that is sick, fatigued or is taking medications which impair judgment or coordination should operate any machines.
- Bystanders shall be kept away from moving machinery. If necessary, a physical barrier shall be placed to prevent bystanders from coming into contact with moving machinery.
- Only one person shall operate a machine at any one time (numerical control machines may be an exception).
- Never use compressed air guns to clean clothing, hair, or aim the gun at another person.
- A brush, hook, or special tool is preferred for removal of chips, shavings, etc. from the work area only after the machine has been turned off. Never use your hands to clean metal chips – they are sharp!
- Keep your fingers clear of the point of operation of machines by using special tools or devices, such as, push sticks, hooks, pliers, etc.



- Keep the floor around machines clean, dry and free from slip and trip hazards. Do not allow chips to accumulate.
- If you have not worked with a particular hazardous material before, check the Safety Data Sheets or contact the safety department for any specific precautions to be taken while working with the chemical. Also, ask the Shop supervisor or the person with authority and control before cutting any unusual material.
- Always store oily rags in approved containers.
- Users of machining equipment / power tools shall be aware of the location of first aid kits, fire exits, fire extinguishers, fire alarms, eye washes, deluge showers, emergency telephones and other safety related equipment and devices.
- Accidents must be reported to the supervisor and the safety department.
- Before operating a machine always know the procedures for shutdown.

6.0 MACHINE SHOP OPERATING AND ACCESS POLICY

Any person wishing to utilize the machine shop equipment must adhere to the following rules and regulations or face revocation of access to the Machine Shop. After hours is defined as before 7:30 a.m., after 4:30 p.m. and during designated lunch hours for shop personnel (Monday through Friday), and all day on Saturday and Sunday.

6.1 AUTHORIZED USERS

Shop users may be authorized to utilize specific machines. This qualification includes specialized training and verification that the authorized user has the skills to operate the designated machine safely as identified in Appendix A. The qualification process also includes verification that the authorized user is effectively utilizing Integrated Safety Management (SP-2).

The list of authorized Machine Shop personnel and the machines they are authorized to use shall be located at the entrance of the shop. The list of authorized personnel will be updated by the Machine Shop Supervisor and a record will be documented by the safety department.

Personnel with demonstrated experience may be authorized at level I, I-A, II, III or III-A to use machines with approval from the Machine shop supervisor or the person with authority and control.

6.2 LEVEL I

Level I users must have their own tools and complete the Level I Machine Shop Qualification card in Appendix A.



- After completion of training the user will receive a **Level I Machine Shop Qualification Card**.
- A copy of the completed Level I Machine Shop Qualification Card must be submitted to the Safety Department.
- When applying the THA process, the consequences (worst case scenario) will always be Moderate to Severe. Therefore, work performed on a machine tool by a Level I person will always require a second worker in the vicinity.
- Level I users will not be granted after hour use of the machine shop without specific authorization from the Shop Manager and the Safety Department.
- Before using any of the shop machining equipment / power tools, a Level I person must obtain approval from the Shop Manager or Supervisor and will be required to demonstrate competency prior to use.

Level I users can choose to be trained on two or more of the machines listed below:

Band Saw	Flap Wheels
Cutoff Saw	Polishing and Wire Wheels
Drill Press	Belt Sander
Shear Brake	Media Blaster

6.3 LEVEL I-A

Level I-A authorization is for users of other machine tools located outside of Machine Shops.

- The Level I-A qualification is intended to cover non-full time machinist personnel in their respective laboratory or work environment.
- To obtain Level I-A authorization, training is to be provided at the specific location of the machine tool by the Machine Shop Manager or designated shop personnel.
- Those with a Level I-A qualification are not to operate any rotating machine shop equipment other than equipment specifically trained upon and at the location of training.
- Personnel that desire to become Level I-A users must schedule an appointment with the Shop Manager or his designee to receive training and verification of skill level. This process may require multiple appointments to verify the necessary skill level prior to use of the machine unsupervised.
- The Machine Shop Manager or designated trainer will upon verification of skill level, complete Level I-A Machine Shop Qualification card for each person that meets the requirement. A copy of the Level I-A Qualification Card shall be submitted to the Safety Department once the qualifications are met.



- When utilizing the THA Process to evaluate hazards prior to performing a task, a Level I-A user is unable to utilize experience to reduce risk; therefore, most tasks performed on a machine by a Level I-A user will be classified as Medium or above and would at a minimum require a second qualified worker in the vicinity and safety approval.

6.4 LEVEL II

To obtain Level II authorization, a user must complete the Level I training for at least three of the Level I machines and demonstrate competency in the use of these machines to the Machine Shop Manager or his designee.

- Personnel that desire to become Level II shop users must schedule an appointment with the Machine Shop Manager or his designee to receive training and verification of skill level. This process may require multiple appointments to verify the necessary skill level to use the machine unsupervised.
- The Machine Shop Manager or his designee will upon verification of skill level, complete a Level II Machine Shop Qualification card for each person that meets Level II Qualification. A copy of the Level II qualification card shall be submitted to the Safety Department once the qualifications are met.
- Level II users may be trained to use the Lathe or the Mill in addition to the Level I machines.
- When applying the THA process, the consequences (worst case scenario) will always be Moderate to Severe. Therefore, work performed on a machine tool by a Level I person will always require a second worker in the vicinity.

6.5 LEVEL III

To obtain Level III authorization personnel must have completed Level I and Level II training or demonstrated equivalent proficiency. Additionally, the following must be met.

- They must have demonstrated to the Machine Shop Manager or his designee a skill level that reflects extensive experience and training.
- Personnel with this designation may use all machines in the shop that they have been trained to use with the exception of the NC Mills and Lathes.
- Level III users have similar rights and responsibilities as the full time machinists with limitations on some NC equipment.
- When utilizing the THA Process to evaluate hazards prior to performing a task, a Level III person can utilize experience to reduce residual risk keeping in mind that the best practice is to have a second worker in the vicinity that can respond in case of an emergency.



Level III-A authorization is for users of other machine tools located outside of Machine Shops.

6.6 LEVEL III-A

- The Level III-A qualification is intended to cover non-full time machinist personnel in their respective laboratory or work environment.
- To obtain Level III-A authorization, verification of machine tool proficiency is to be provided at the specific location of the machine tool by the Machine Shop Manager or designated shop personnel.
- If the user holds the appropriate experience and training, verification of skill level may be provided at the specific location of the machine tool by the Machine Shop Manager or designated shop personnel.
- Those with a Level III-A qualification are not to operate any rotating machine shop equipment other than equipment specifically trained upon and at the location of training/verification.
- Personnel that desire to become Level III-A users must schedule an appointment with the Shop Manager or his designee to receive training and verification of skill level.
- The Machine Shop Manager or designated trainer will upon verification of skill level, complete Level III-A Machine Shop Qualification card for each person that meets the requirement. A copy of the Level III-A Qualification Card shall be submitted to the Safety Department once the qualifications are met.
- When utilizing the THA Process to evaluate hazards prior to performing a task, a Level III-A user is able to utilize experience to reduce assessed residual risk.
- Those with a Level III-A qualification will be able to provide training and authorization on their low risk tier equipment.

7.0 SHOP ACCESS

All personnel with official Machine Shop business may access the Machine Shops between the hours of 7:30 a.m. and 4:30 pm unless designated otherwise by the Machine Shop Manager. Personnel accessing the shop during these hours must:

- Not disturb machinists when they are working on a job.
- Wear safety glasses with side shields (prescription eyewear not designed to be safety glasses is not sufficient; safety glasses must be worn over prescription eyewear).
- Only use the machines they are trained to use. An approval and work order is required.

Machine Shop should not be used as a walkthrough or shortcut. Any authorized employee that abuses their access privileges will have their shop access revoked.



8.0 AFTER HOURS PROCEDURE

Only NHMFL machinists, Level III personnel, or trained personnel that have been specifically authorized by the Shop Manager/Supervisor and the Safety Department will have afterhours access to the Machine Shop. If the shop must be used after hours for emergency purposes, the contact information for the Machine Shop Manager as listed on the machine shop door and the Safety Department can be contacted at 855-SAFEMAG (723-3624).

The fully enclosed NC milling machines and wire EDM may be operated by a single approved machinist after hours if:

- The automated safety features are in place and not defeated at any time during operation.
- The spindle must be stopped prior to opening access doors.
- All safety rules must be adhered to.

9.0 SHOP RULES:

- Never lend out Machine Shop keys or give access to unauthorized personnel.
- Always use the required Personal Protective Equipment.
- Never use equipment you have not been authorized and trained to use.
- Clean up after yourself.
- Notify shop personnel immediately if equipment is in need of repair.
- Notify shop personnel immediately if you need assistance using a tool.
- If you accidentally damage a machine or tool, bring it to the attention of the shop manager immediately. Do not attempt to hide or cover up any damages.
- Always make sure that all power tools are turned off before leaving the machine. Never leave an unattended machine running, even for “one second” (with the exception of NC Machines).
- No person shall work in Machine Shops while under the influence of drugs or alcohol. Prescribed drugs that could cause drowsiness, lightheadedness, or disorientation should also be considered.
- The machine shop is an eye protection area and safety glasses are required whenever entering this space. In general, when operating any power tool, safety glasses are to be worn. This includes prescription safety glasses with the mandatory side guards.
- When finished working in the Machine Shop personnel must clean the machine and the surrounding area, and return tools to their proper place. Make certain the door of the Machine Shop is closed and locked behind you.

If an employee is injured and requires non-urgent or no medical treatment, the employee must immediately report the accident to their supervisor and the safety department.



If an employee requires emergency medical treatment, they should go directly to the hospital or call emergency medical services by dialing 911. Then report the incident to their supervisor and the safety department.

Any person removed from the shops for the above reason shall not be allowed to return unless authorized by their supervisor, Machine Shop Manager, and Safety Department personnel.

10.0 WORK REQUEST:

Work Requests are to be filled out for ALL work activity:

Job requests may be submitted to any available machinist, the Shop Supervisor or Shop Manager. Machinists should not be disturbed while working on a job. Urgent jobs can be submitted to the Shop Manager in A114 or to the Shop Supervisor.

- The work order describes the job, department, requestor, budget number, project number, and THA.
- Work cannot begin until the THA has been reviewed and initialed by a NHMFL shop or level III employee.
- If a job submitted by a level I or II employee is determined to be a medium or greater risk, the job shall default to a machine shop department activity.
- Jobs that require tasks beyond standard operating procedures shall follow the SP-2 THA procedure. The shop shall maintain a file of THA evaluations for 60 days.



FileMaker Pro

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NewShopRecords (fms.magnet.fsu.edu)

3917 3917 Total (Unsorted)

Records Show All New Record Delete Record Find

Layout: Request Form View As: Preview Edit Layout

NATIONAL HIGH MAGNETIC FIELD LABORATORY

Machine Shop

Work Request

SUMMARY LIST VIEW

Work Order No. 12249

Requestor Information:

Charge To: Dept. # Project # Grant /Acct. # Desired Complete Date Required Complete Date

Dept Name Project Name Dept Contact Phone Number Authorized Signature

Description

Special Tooling:

All jobs require a THA evaluation

Hazard Assessment Matrix		Complexity		
		Simple	Moderate	Difficult
Familiarity Level	Very Familiar	1	2	3
	Somewhat Familiar	2	3	4
	Unfamiliar	3	4	5

Assessed Hazard	Consequences				
	Negligible	Minor	Moderate	Significant	Severe
5	Low Med	Medium	Med High	High	High
4	Low	Low Med	Medium	Med High	High
3	Low	Low Med	Medium	Med High	Med High
2	Low	Low Med	Low Med	Medium	Medium
1	Low	Low	Low Med	Low Med	Medium

Q.A. Check by _____

Shop Information:

Date Received 1/12/2017 Date Modification Received

Machinist

Total Hours Required

Labor Charge

Materials Charge

Date Material Ordered Date Material Received Date completed Shop Signature

100 Browse



11.0 TASK HAZARD ANALYSIS

11.1 Table 1. Hazard Assessment Matrix

		Complexity		
		Simple	Moderate	Difficult
Familiarity Level	Very Familiar	1	2	3
	Somewhat Familiar	2	3	4
	Unfamiliar	3	4	5

11.2 Table 2. Residual Risk Assessment Matrix

Assessed Hazard Level	Consequences				
	Negligible	Minor	Moderate	Significant	Severe
5	Low Med	Medium	Med High	High	High
4	Low	Low Med	Medium	Med High	High
3	Low	Low Med	Medium	Med High	Med High
2	Low	Low Med	Low Med	Medium	Medium
1	Low	Low	Low Med	Low Med	Medium



Rules for the Residual Risk Categories

Identify if the activity is covered by a Safety Operating Procedure (SOP) or Permitted Safety Operating Procedure (PSOP) and if the worker is qualified to perform the procedure. If not, then perform a Task Hazard Analysis (THA) to determine what the residual risk category is. The THA will determine what the Residual Risk Category is for the activity.

Low

- Safety controls can be planned by the worker.
- Proceed with supervisor authorization.

Low Med

- Safety controls are planned by both the worker and supervisor.
- A second worker knowledgeable of the task and hazards is in the vicinity.
- Proceed with supervisor authorization.

Medium

- Have the Safety Department review and approve the completed THA.
- Additional information on the task process may be required by the Safety Department through the implementation of a Safety Operating Procedure (SOP).
- Two qualified workers must be in place before work can proceed.
- Limit the number of authorized workers in the hazard area.

Med High

- Have the Safety Department review and approve the completed THA.
- A written and approved SOP is required and must be authorized by the Safety Department and the MagLab Director or his/her designee.

High

- The activity will not be performed.



12.0 MACHINE SPECIFIC SAFETY GUIDELINES AND OPERATING PROCEDURES

Prior to using any machine in the machine shop or commonly found in machine shops, personnel must receive appropriate training on the safe use of the machine. If the machine is located in a lab, the supervisor may provide this training using the Qualification Card listed in Appendix A. When entering the machine shop or working with machines commonly found in machine shops, eye protection must be worn at all times. Gloves, loose clothing, long hair, dangling accessories, jewelry and other similar items that could get caught in the moving machine shall **not** be worn when the machine is operating.

12.1 DRILL PRESS



- Work must be securely clamped to the table to prevent it from spinning.
- The speed setting of the drill shall be appropriate to the work being done.
- The bit shall be mounted securely to the full depth of the chuck and in the center.
- The chuck key must be removed before starting the drill.
- Machine guards must not be tampered with or removed.
- The drill spindle shall be allowed to stop of its own accord.
- The machine shall be cleaned of chips and cutting fluid after use.
- The chips shall be removed using a brush, never by hand.

12.2 GRINDER



- **No grinding of soft metals such as aluminum, copper, brass (belt sander is recommended).**



- Grinding wheels shall be examined for cracks before turning the machine on. Wheels that are badly worn or cracked shall be replaced.
- No flammable or combustible materials that could be ignited by the sparks from the grinder wheel shall be present nearby.
- Before using a new wheel, the wheel shall be left running for few seconds to ensure it is balanced.
- If excessive imbalance or wobbling is noted the grinder must be shut off.
- A grinding wheel that has been dropped or received a heavy blow shall not be used, even if there is no apparent damage.
- A wheel proper to the work being done must be used (diamond wheel for carbide, aluminum oxide for high speed steel).
- Work shall not be forced against the wheel.
- The gap between the face of the wheel and tool support must be kept to a minimum.
- The guard must be as close as possible to work being ground. The guard must never be removed or tampered with.
- The cutting surfaces shall be kept sharp by properly dressing the wheel.
- Water container shall be kept handy for cooling off the work piece.
- The wheel shall be stopped before making adjustments. The machine shall be stopped when not in use.
- Users shall keep hands clear of the rotating grinding wheel.

12.3 LATHE



- All belt and gear guards must be in place before starting the machine.
- The lathe must be stopped to perform any adjusting, measuring, cleaning or lubricating.
- The spindle shall be stopped by shutting the lathe off and letting it coast to a stop. If the lathe is equipped with break treadle, the break treadle shall be depressed to stop the spindle.
- The users must never attempt to stop the spindle with hands or fingers.
- The lathe shall not be stopped by reversing its direction of rotation.
- The chuck key must be removed before starting the machine.
- The users shall keep hands clear of the chuck rim when the lathe is in motion.
- All work shall be solidly clamped with an appropriate size work-holding device.
- All work shall be solidly supported.
- Files used shall have sound handles.
- The chips shall be removed using a brush or pliers, never by hands.



- No sand paper or polishing cloth shall be wrapped around any revolving part of the lathe.
- If vibration or odd noise develops, the machine shall be stopped immediately.
- No tool changes while the lathe is running.
- Chucks shall be securely locked in place.

12.4 MILLING MACHINE



- Users of milling machines must fully understand all the machine controls before starting the work.
- Feed controls must be in neutral before the machine is started.
- Tools and loose materials must be kept away from the cutter.
- Proper feed rate and spindle speed must be used.
- The holding device shall be solidly mounted to the table and the work firmly held before commencing work.
- Adjustments must not be made near a moving cutter.
- The cutter must be stopped to check the work and clear away metal chips.
- Chips shall be removed with a brush, not the hand.
- Before cleaning work is carried out, the machine must be isolated from the power supply.
- Before changing a work piece, the milling fixture, the vise or the clamp must be withdrawn well clear of the cutting area.
- Sharp edges shall be removed from completed work.

12.5 BAND SAW



- Adjustable guards shall be kept as close over the point of operation as the work permits.
- Band wheel covers must be closed before starting machine.
- The saw shall be at full speed before starting to feed in work. Stock shall be fed into the saw only as fast as the teeth will easily remove material.
- Stock shall be held flat on the table.
- The machine shall be stopped before making adjustments or measurements.
- The power must be turned off before removing panels or drive covers. Safety features on the vertical band saw will not allow the machine to operate while performing a blade change.



- Users must never reach over the sawline to position or guide materials.
- Proper speeds and blades shall be used for the material being cut.
- Dust collector shall be used when dust is generated.
- The operator shall not leave the table until the blade has come to a complete stop.

12.6 SANDER



- When working with wood, respirators shall be worn.
- The small work pieces shall be held by a clamp, vise, vise grips or pliers
- The belt of the belt sander shall be free of tears and defects.
- The belt shall be mounted correctly. The sanding belts shall not be too tight or too loose.
- Care must be taken when holding a metal work piece. The metal can heat up due to friction from the sander. Gloves can be worn when handling metal work pieces but care should be taken to ensure that the gloves do not come in contact with the belt.
- Belt sanders shall have both the pulleys and the unused run of the sanding belt enclosed.
- Disc sanders shall have the periphery and back of the revolving disc guarded, and the space between the revolving disc and the edge of table shall not exceed ¼ inch.
- Correct grade of abrasive material must be used.
- Materials must not be pushed against the sander with excessive force.

12.7 SHEAR



- Before the machine is used, all cuttings and scrap from the shear table and the surrounding area shall be removed.
- Users shall avoid touching knife edges when taking measurements.
- The shear table shall be kept free of loose tools and materials.
- Safety guards shall not be removed or tampered with.
- When clamping, the user shall keep the other hand away from hold down.



- Only the persons operating the machinery shall be in close proximity of the shear.
- Leather gloves should be worn when handling sheet metal.
- Scraps shall be removed promptly and deposited in the appropriate scrap bin.
- Shear must only be used to cut materials specified in the manufacturer instructions.
- Review material thickness chart posted on the machine.

12.8 CUTOFF SAW



- Proper abrasive cutting wheel for the material being cut must be used.
- The rpm of the saw must not exceed the manufacturer's specifications.
- The center hole on the blade must fit the mandrill and be snugly fastened in place with proper washer and lock nut.
- The blade guard must not be removed.
- The blade must be stopped before moving material.
- The far end of the material being cut shall be supported.

13.0 TRAINING REQUIREMENTS

To be granted access to use machines in the Machine Shop, personnel must complete the Qualification Card for the desired level of training. Level I Machine Shop training will be offered quarterly based on demand. Level II and III training must be scheduled with the Machine Shop Manager or his designee.



13.1 EXAMPLE OF MACHINE SHOP TRAINEE QUALIFICATION CARD:



NHMFL

FLORIDA STATE UNIVERSITY

**MACHINE SHOP TRAINEE
QUALIFICATION CARD**

NAME: _____

DATE QUALIFICATION CARD ASSIGNED: _____

QUALIFICATION DUE DATE: _____

QUALIFICATION COMPLETION DATE: _____

Level I.

A level I worker must successfully complete a machining project using two or more of the level I machines that has been preapproved by one of the trainers.

<u>REQUIRED TRAINING</u>	SIGNATURE	DATE
A. NHMFL training up to date	_____	_____
B. MACHINE SHOP SAFETY SP-32 (Quiz)	_____	_____
C. INTEGRATED SAFETY MANAGEMENT	_____	_____
BLOCK SIGNATURE _____	Safety Department	

LEVEL I TOOLS:

	<u>SIGNATURE</u>	<u>DATE</u>
A. HAND TOOLS (Files, polishing, drilling)	_____	_____
B. MEDIA BLASTER	_____	_____
C. CUTOFF SAW	_____	_____
D. DRILL PRESS	_____	_____
E. SHEAR	_____	_____
F. BRAKE	_____	_____
G. BELT SANDER	_____	_____
H. BAND SAW	_____	_____
I. WIRE WHEEL / BUFFER	_____	_____
BLOCK SIGNATURE _____	Immediate Supervisor	

FINAL CHECK-OUT, TEST AND WALKTHROUGH:

1. FINAL PROJECT	_____	_____
	Trainer Signature	Date
2. FINAL WALKTHROUGH	_____	_____
	Trainer Signature	Date

LEVEL I QUALIFIED:

TRAINER: _____ DATE: _____

TRAINEE: _____ DATE: _____

COMMENTS: _____

Level I-A

Level I-A training must be scheduled with the machine shop manager or his designee. To obtain Level I-A authorization, personnel must demonstrate competency in the use of the specific machine to the machine shop manager or shop personnel. Level I-A qualification does NOT authorize the employee to use any other machine tool at the NHMFL

LEVEL I-A TOOLS:

<u>ITEM</u>	<u>SIGNATURE</u>	<u>DATE</u>
A. MILL	_____	_____
B. LATHE	_____	_____

Level II.

Level II training must be scheduled with the machine shop manager or his designee. To obtain Level II authorization, personnel must complete the Level I training for at least three of the Level I machines and demonstrate competency in the use of these machine to the machine shop manager or shop personnel. Level II workers can use the Lathe or Mill in addition to the Level I equipment they have been trained to use.

LEVEL II TOOLS:

<u>ITEM</u>	<u>SIGNATURE</u>	<u>DATE</u>
A. MILL	_____	_____
B. LATHE	_____	_____

Level III.

These personnel must have completed Level I and Level II training. They must have demonstrated to the machine shop manager/supervisor a skill level that reflects extensive experience and training. Personnel with this designation may use all machines in the shop that they have been trained to use with the exception of the NC Mills and Lathes.



<u>ITEM</u>	<u>SIGNATURE</u>	<u>DATE</u>
A. Level III Qualified	_____	_____

14.0 REVISIONS AND APPROVALS

Revisions

Date	Revision #	Section	Description
01/20/2017	001	All	Machine Shop safety sub-committee review
03/02/2017	002	All	Final approval review and markup
7/31/2024	003	All	Updated formatting

Approvals

Title	Reviewer	Signature
NHMFL Director of Safety	Alfie Brown	<div>DocuSigned by:  244772F051A0421...</div>
Subject Matter Expert	Andy Rubes	<div>Signed by:  23C3DBEA7DE94B2...</div>