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ENGINE AND TURRET LATHE SAFETY GUIDE

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Services
Centers for Disease Control
National Institute for Occupational Safety and Health
Division of Safety Research

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LATHE SAFETY GUIDE
ENGINE AND TOOL

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HOW THIS GUIDE WILL HELP YOU

This Guide has been developed to help in-plant safety personnel and shop supervisors, like you, to reduce injuries on metalcutting engine and turret lathes. It is intended as a supplement to existing lathe safety information, such as manufacturers' equipment manuals and OSHA and ANSI standards¹⁻⁶. This Guide is based on reported injuries and can be used to update your safety program and during safety meetings.

This Guide is designed to meet the specific needs found in a wide variety of shops. Whether your shop is a small job shop, a large production shop, a tool and die/experimental shop, or a maintenance shop, the guidelines contained in this Guide can improve safety in your lathe operations.

This Guide includes three kinds of information for improving metalcutting lathe safety. These are:

1. A list of general guidelines designed to reduce engine and turret lathe injuries to your workers.
2. A method for identifying specific guidelines set forth in this Guide that are appropriate to the safety needs of your shop.
3. Suggestions to help you implement these guidelines.

WHY A LATHE SAFETY GUIDE IS NECESSARY

An extensive nationwide study of metalcutting lathe safety⁷ revealed that a large number of metalcutting lathe injuries occur and are reported annually on the approximately 330,000 manually operated metalcutting lathes operating in the United States. Many of the reported injuries involved fractures, amputations and death. The results of the study of 538 injuries in seven industrial states indicated the following injury factors:

LATHE OPERATION

- o 5 TIMES AS MANY INJURIES OCCUR DURING SECONDARY LATHE OPERATIONS (SETTING UP THE LATHE, LOADING/UNLOADING THE CHUCK, ETC.) AS OCCUR IN PRIMARY OPERATIONS (TURNING, FACING, ETC.).
- o 22% OF THE LATHE INJURIES INVOLVE THE WORKER STRIKING OR BEING STRUCK BY CUTTINGS OR CHIPS.

SOURCE OF INJURY

- o 23% OF THE LATHE INJURIES INVOLVE THE LATHE CHUCK OR WORK-HOLDING DEVICE.

HUMAN FACTOR

- o 27% OF THE INJURIES RESULT FROM UNSAFE ACTS ASSOCIATED WITH LATHE OPERATIONS (SUCH AS PLACING A HAND ON A ROTATING CHUCK WITH THE JAWS EXTENDED, OR FORGETTING TO REMOVE THE CHUCK WRENCH BEFORE STARTING THE LATHE).
- o 17% OF THE INJURIES RESULT FROM THE WORKER'S HAND OR HANDTOOL (SUCH AS A FILE OR DEBURRING TOOL) SLIPPING FROM SOME PART OF THE LATHE OR WORKPIECE.

HOW YOU SHOULD USE THIS GUIDE

Two groups of safety guidelines are provided. The first group is general guidelines applicable to any shop. The second group is guidelines applicable to safety problems associated with your specific shop conditions. This Guide takes into account the fact that all shops are not the same, and it provides a method for you to identify guidelines appropriate to the safety needs of your shop.

The safety guidelines are set forth in two parts on each page. The left side provides the actual guidelines; the right side provides supplementary information to aid you in implementing the guidelines. This supplementary information is presented to help you develop your own "customized" solutions for implementing the guidelines.

There are eight steps you should follow in using this Guide. They are:

Step 1. Read and Apply the General Safety Guidelines. General safety guidelines deal with safety problems associated with all types of shops. They cover personal safety and protection, safety practices, and lathe/accessory maintenance. These guidelines are presented on pages 4 through 9 of this Guide.

Step 2. Survey the Jobs Being Performed on Each Lathe In Your Shop. Be familiar with or discuss with shop personnel the size, weight, and shape of the parts machined on each lathe; the number of these parts produced per job; the amount of time each part is in the lathe; the kind of operations performed to produce each part (e.g., set-up, turning, filing, etc.) and the kind of material from which the parts are machined. In order to use this guide properly you must be acquainted with this information.

Step 3. Answer the Checklist Questions to Determine What Specific Safety Guidelines are Appropriate to Your Shop. Ten checklist questions are presented on page 10 of this Guide. The answers you provide will determine what specific safety guidelines are applicable in your shop. **READ THESE QUESTIONS CAREFULLY.**

Step 4. Read the Specific Safety Guidelines Associated With the Checklist Questions You Have Answered With YES. Specific guidelines are intended to aid you in controlling your shop's particular safety problems associated with the operation of engine and turret lathes. These guidelines address the conditions resulting from the variety of jobs performed in shops. These guidelines are presented on pages 11 through 26 of this Guide.

Step 5. Develop "Customized" Solutions Based on Review of the Specific Safety Guidelines and Supplemental Information.

Prepare a sketch, description, specification, etc. of the solution. Compare the customized solution with the safety guideline and supplemental information. Make certain the solution incorporates the required features or aspects of the guideline and supplemental information.

Step 6. Review the Customized Solutions With Shop Foremen or Supervisors, Safety Personnel, Workers and Union. Such reviews can help eliminate or reduce objections to the solution that could prevent it from being accepted in the shop.

Step 7. Periodically Check the Lathes to Make Certain There Are No Problems Associated With Your Solutions. No matter how well thought out safety solutions are, unexpected conditions will arise and create problems. Such problems can be quickly discovered and eliminated by periodically checking the lathes.

Step 8. Develop and implement safe work practices and procedures, provide appropriate worker training, and enforce adherence to established policies. Management must carry out these safety responsibilities as part of a good overall safety program.

GENERAL SAFETY GUIDELINES

Safety Guidelines

1. Provide restraining devices for workers with long hair or loose clothing. **MANAGEMENT PERSONNEL SHOULD ENFORCE THE WEARING OF SUCH DEVICES.**
2. Provide workers with eye protection that is appropriate for the jobs they are expected to perform on shop lathes. **MANAGEMENT PERSONNEL SHOULD ENFORCE THE WEARING OF EYE PROTECTION.**
3. Require workers to wear safety shoes in shops.
4. Warn workers not to rest or lean their hands or arms on **OPERATING LATHES** when they are talking with fellow workers, reading engineering drawings, checking a recently machined part, etc.

Supplemental Information

1. In spite of recognition that long hair and loose clothing are a hazard around moving machinery, workers are still being injured. Supervisors and safety personnel should continually watch for workers with long hair and loose clothing. Be particularly watchful for workers wearing oversize shirts that have "baggy" sleeves. Rubber bands or clips can be used to secure this type of loose clothing.
2. At least two types of eye protection should be supplied. One is the "safety eyeglasses" with side shield that can not be removed. Sometimes removable side shields are removed and never replaced. The other is the full face shield for use during high-speed machining. This full shield should be worn in addition to regular safety glasses.
3. Even in the smallest tool shop there is the potential for workers to drop a workpiece, lathe chuck, faceplate, or steadyrest on their feet.
4. It is natural for workers to rest their hands, arms or feet on lathes. Because of chip formation, the spinning workpiece and chuck, and carriage movement, this practice is dangerous since workers' attention is generally not directed at the location of their hands, arms or feet resting on the operating lathes. Providing other supports, such as benches or stools, will encourage workers not to rest their hands, arms or feet on operating lathes.

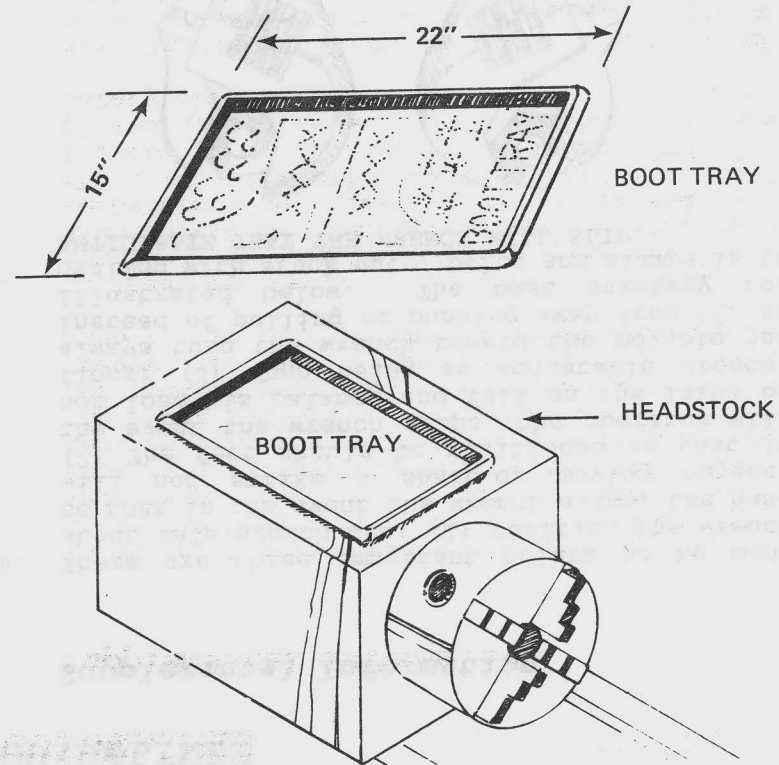
GENERAL SAFETY GUIDELINES

Safety Guidelines

5. Provide convenient storage for small tools such as wrenches, hammers, drills, etc. Also establish procedures that workers stop the head-stock spindle by disengaging the clutch and stopping motor when retrieving tools that have fallen in close proximity to a rotating chuck or workpiece.

Supplemental Information

5. Tools often fall from where they are placed because of machine vibration or accidental bumping. Proper tool storage on, or adjacent to, lathes will help prevent this from occurring. Benches should be placed behind the worker to provide a convenient place to lay tools during lathe operations. Rubber pads, such as "Boot Trays," may be fixed on lathe headstock spindles that are flat. These trays can be purchased at any hardware store for a nominal cost. Below is an illustration of a boot tray showing overall dimensions.



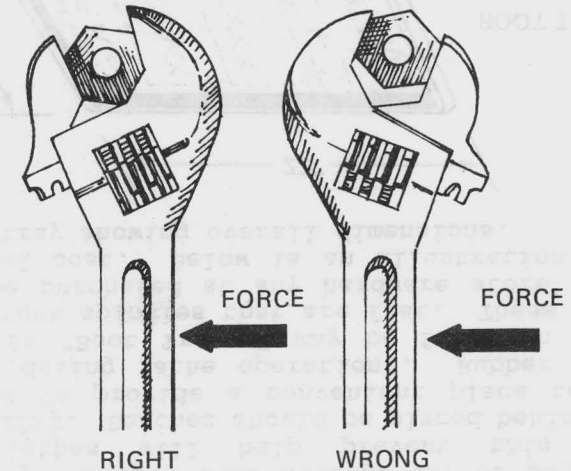
GENERAL SAFETY GUIDELINES

Safety Guidelines

6. Instruct workers, especially apprentices, on how to safely use a wrench to loosen tight nuts, bolts and clamps on lathes and accessories.

Supplemental Information

6. There are three important points to be made about safe wrench use: (1) Position the wrench so that in the event the wrench slips, the hand will not strike a sharp or moving object; (2) The feet should be positioned so that in the event the wrench slips, the operator will not lose his balance and fall on the lathe or floor; (3) When using an adjustable wrench, always turn the wrench toward the movable jaw instead of pulling or pushing away from it, as illustrated below. The best strategy for dealing with stuck nuts, bolts and clamps is to **ANTICIPATE THAT THE WRENCH WILL SLIP.**



7. Provide workers with the correct wrench sizes for the jobs they are required to perform.

7. Wrenches, like other frequently used tools, can soon be lost after they are purchased. Wrench losses can be minimized if proper storage is provided on, or close to the lathes.

GENERAL SAFETY GUIDELINES

Safety Guidelines

8. Instruct apprentices in the proper method of shifting lathe control levers.

9. Provide workers with wiping cloths to keep control levers, chucks and accessories free from grease and oil.

10. Require that workers remove unneeded sharp cutting tools, drills, etc. when there is a chance of accidentally striking them. Place covers over those cutting tools that cannot be removed.

Supplemental Information

8. There are three key points to remember when shifting lathe control levers: (1) Make certain that handles are free from oil and grease. This point is particularly important when lathe operations require the use of cutting oils, (2) Place the hand firmly around the handle, fingers should reach to the backside of the handle, and (3) Apply moderate pressure to the handle. Well maintained lathe controls should not require excessive pressure to operate.

Before shifting the clutch lever, workers should develop the habit of **VISUALLY CHECKING** the chuck and workpiece for loose objects (chuck wrench, clamps, etc.).

At the end of the work shift, workers should always disengage the lathe clutch and turn off the motor when machining operations do not continue into the next shift.

9. Wiping cloths should not be "torn rags" since ravelling can easily catch in moving machinery. The safest wiping cloths are rectangular shape cloths with sewn hems on all edges.

10. Often unneeded tools are not removed because there is no storage close to the lathe. Placing holding magazines close to the lathes should encourage workers to remove the unneeded tools, drills, etc.

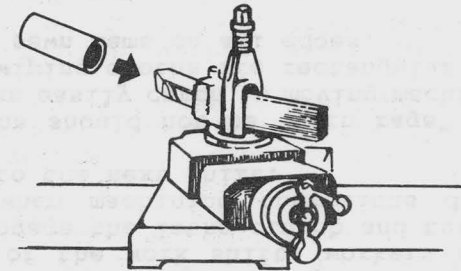
GENERAL SAFETY GUIDELINES

Safety Guidelines

Supplemental Information

One method of covering cutting tools that cannot be removed is suggested below.

RUBBER OR PLASTIC
TUBING PLACED OVER
CUTTING TOOL



8

11. Provide hand tools that have handles offering a good hand grip.

12. Replace defective, worn or undersized bolts, nuts, or parts on lathes, chucks or other holding devices and accessories. Periodically check chuck jaw with a chuck jaw force gauge.

11. Handles that offer a good hand grip are those which: (a) are at least 3" long and 3/4" to 1-1/2" in diameter, and (b) have a textured surface.

Inform purchasing agents as to the exact make, style, type, size, etc. of hand tools desired.

12. Workers should check equipment at least once every month. Provide examples of worn bolts, nuts, etc. so that workers can recognize when a worn bolt should be replaced. Supervisors and safety personnel should spot-check equipment frequently.

GENERAL SAFETY GUIDELINES

Safety Guidelines

13. Replace all defective or worn wrenches used on lathes, chucks or other holding devices, and accessories. Make certain that adjustable parts on wrenches will not slip under pressure.
14. Inspect and repair headstock spindle braking devices that are not operating properly.
15. Inspect and repair headstock spindle clutches that could accidentally engage as a result of (a) mechanical failure, or (b) inadvertent bumping. Inspect and repair other control levers that do not operate properly.
16. Install interlocks that switch power off when transmission guarding is removed or when frequently-used access doors are opened. When cover plates are removed, a lockout procedure should be enforced.

Supplemental Information

13. Workers should check wrenches frequently. Provide examples of worn wrenches so that workers can recognize when a worn wrench should be replaced. Supervisors and safety personnel should spot-check wrenches frequently.
14. Providing properly operating braking devices will reduce the worker's desire and need to stop the chucks with their hands. Installation of braking devices on lathes that are not so equipped is highly recommended.
15. On lathes (mainly older ones) that do not have positive locator devices to minimize accidental engagement of the clutch, install mechanical stops or checkstops that must be overridden to engage the clutch. One possible solution would be the kind of device requiring the worker to perform two control movements to engage the clutch, e.g., moving the clutch control lever up, and then to the right.
16. Interlocks are either mechanical or electrical devices installed on the lathe that prevent the lathe from being operated unless transmission guarding is replaced or an access door is properly closed. These devices should be installed in places where they are not easily damaged and cannot be easily defeated by the worker.

Lockout procedures are company established procedures that require the power to the lathe to be "locked out" usually with a padlock, so the lathe cannot be operated .

Checklist Questions

	YES	NO	If Yes, See Safety Guide Page Number
1. Do you machine material that results in long stringy cuttings?	<input type="checkbox"/>	<input type="checkbox"/>	11
2. Do you use manually operated chucks?	<input type="checkbox"/>	<input type="checkbox"/>	13
3. Do you perform filing or polishing operations?	<input type="checkbox"/>	<input type="checkbox"/>	14
4. Do you produce large hot chips that could strike the worker, or use coolant that could splash on the worker?	<input type="checkbox"/>	<input type="checkbox"/>	16
5. Do your setups involve the mounting of work pieces on faceplates or fixtures, between centers, or between chucks and centers?	<input type="checkbox"/>	<input type="checkbox"/>	18
6. Do you machine large, heavy or irregular shaped workpieces that require two hands to lift or position during loading/unloading, or setup operations?	<input type="checkbox"/>	<input type="checkbox"/>	21
7. Do you machine workpieces that can not be safely lifted or positioned by one worker during loading/unloading, or setup operations?	<input type="checkbox"/>	<input type="checkbox"/>	22
8. Do jobs require the workers to use 2" or larger GO/NO-GO gauges to measure workpieces that are mounted in chucks or holding devices?	<input type="checkbox"/>	<input type="checkbox"/>	23
9. Do you make setups that are used for producing two or more workpieces (one at a time) which require only one hand to load/unload them from a manually operated chuck?			
OR			
Do you use chucks that when mounted on a lathe are higher than the eye level of a worker standing at the lathe?	<input type="checkbox"/>	<input type="checkbox"/>	25
10. Do you use chucks or other holding devices that are pneumatic or hydraulically operated, or collets that are lever operated?			
OR			
Do you perform machine operations in which the workpiece will be mounted in the lathe for extended periods of time (several hours or longer) without workers having to adjust the chucks?	<input type="checkbox"/>	<input type="checkbox"/>	26

SPECIFIC SAFETY GUIDELINES 1

Safety Guidelines

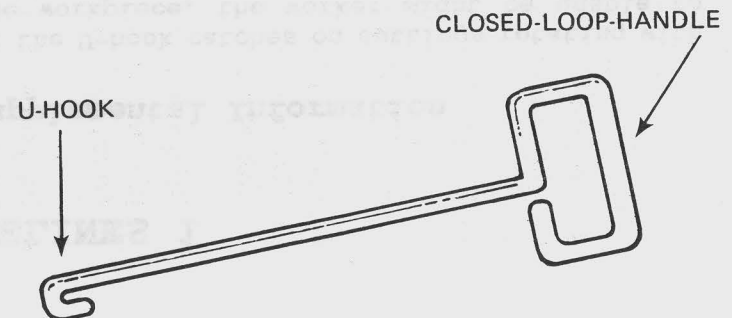
1. Provide workers with or ensure their knowledge of: a) cutting tools made of the proper material, with the proper tool geometry, and with chipbreakers, and b) information regarding the proper depth of cuts, feeds and speeds for each job.
2. Instruct apprentices on how to position cutting tools.
3. Require that workers disengage the headstock spindle clutch and turn off motor to remove long stringy cuttings that cannot be prevented from forming.
4. Provide workers with safe cutting removal tools where it is impractical to stop the spindle to remove cuttings.

Supplemental Information

1. The best approach to reducing injuries involving long stringy cuttings is to prevent the cuttings from forming. Correct cutting tools and information regarding depths of cuts, feeds and speeds should be provided to the workers at the time engineering drawings and materials are provided for a particular job.
2. The positioning of cutting tools on the lathe is just as important as having the correct cutting tools, and information about depths of cuts, feeds and speeds. Supervisors and foremen should verify that apprentices have positioned cutting tools correctly.
3. When removing cuttings with the spindle stopped, the worker should use pliers and protective gloves.

Since many unsafe cutting removal tools are fabricated at the moment of need, safety considerations are often overlooked. **CHECK ALL CUTTING REMOVAL TOOLS NOW BEING USED IN YOUR SHOPS TO DETERMINE IF THEY ARE UNSAFE.**

An example of an unsafe cutting removal tool is shown below.



SPECIFIC SAFETY GUIDELINES 1

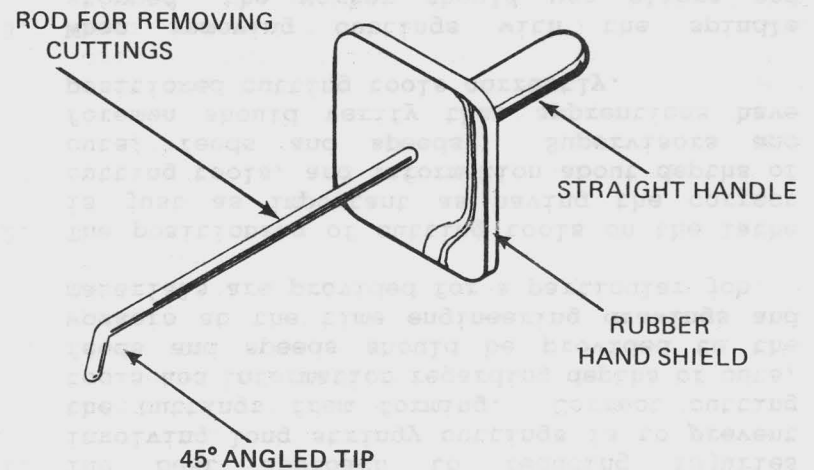
(continued)

Safety Guidelines

Supplemental Information

If the U-hook catches on cuttings rotating with the workpiece, the worker might be unable to release the handle quickly, and his hand, arm, or possibly his entire body could be pulled into the lathe. A safe cutting removal tool is one that if caught in cuttings rotating on the chuck or workpiece, will slip easily from the worker's hand.

Below is one suggested design for a safer cutting removal tool.



SPECIFIC SAFETY GUIDELINES 2

Safety Guidelines

1. Provide the correct size wrenches for all lathe chucks.
2. Instruct apprentices in the proper method of tightening and loosening chuck jaws.
3. Require workers not to extend chuck jaws beyond the outer diameter of the chuck.
4. Ensure that all chuck wrenches are highly visible from where the worker normally stands when operating the lathe when the wrench is inserted in the chuck socket.

Supplemental Information

1. Check all lathe chucks that are in operating condition to determine if the correct size wrenches are available. Be certain to check for undersize wrenches. To minimize the possibility of wrenches being lost or misplaced, provide storage on or adjacent to the lathes.
2. The key points to remember when using a chuck wrench are to make certain that: a) the driving end of the wrench is properly inserted into the chuck socket, b) hands have a good grip on the wrench handle, and c) feet are positioned apart on a non-slip surface. **DON'T FORGET TO REMOVE THE CHUCK WRENCH BEFORE STARTING THE LATHE.**
3. In many situations, having the chuck jaws extended beyond the outer diameter of the chuck indicates that the chuck is too small for the workpiece. **MAKE CERTAIN YOU ARE USING THE CORRECT SIZE CHUCK FOR THE WORKPIECE YOU INTEND TO MACHINE.**
4. To make the chuck wrenches highly visible: a) apply a reflective material to the shank of the wrench (not the handle), and b) provide sufficient lighting in the chuck area to make the chuck wrench easily distinguishable from any background material.

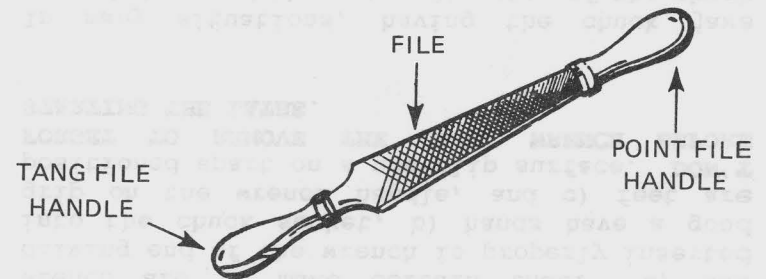
SPECIFIC SAFETY GUIDELINES 3

Safety Guidelines

1. Replace defective files and file handles that are missing.
2. Provide workers with files that are appropriate for the jobs they are expected to perform on the lathe. Appropriate setup equipment should also be included.

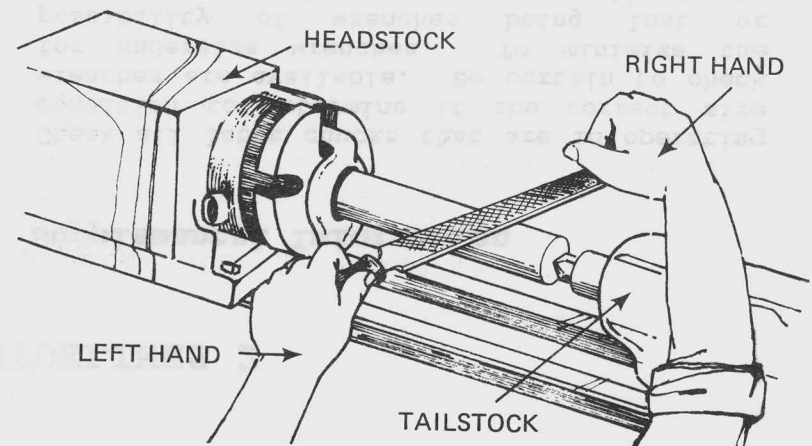
Supplemental Information

1. Workers should check files at least once every six months. Supervisors and safety personnel should spot-check equipment periodically.
2. Provide handles for the file points to encourage workers to use two hands when filing on the lathes as shown in the illustration below.



3. Instruct workers, especially apprentices, in the proper method of filing and polishing on the lathe. Emphasize the importance of choosing the correct tool for the job. Safe setup procedure should be included in the instruction.

3. When filing on the lathe, hold the tang file handle with the left hand and the point of the file with the right hand as shown below.



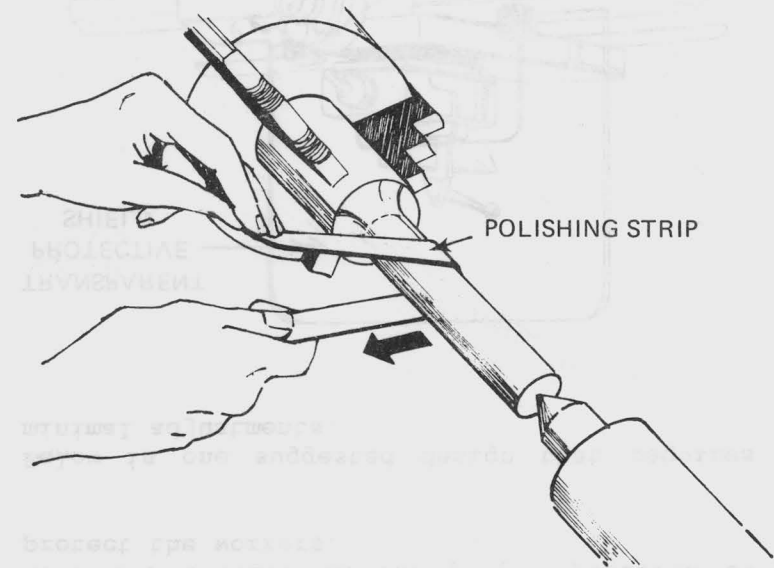
SPECIFIC SAFETY GUIDELINES 3

(Continued)

Safety Guidelines

Supplemental Information

When polishing on the lathe, use a polishing strip of adequate length and apply polishing pressure by pulling the bottom half of the strip as shown below.



SPECIFIC SAFETY GUIDELINES 4

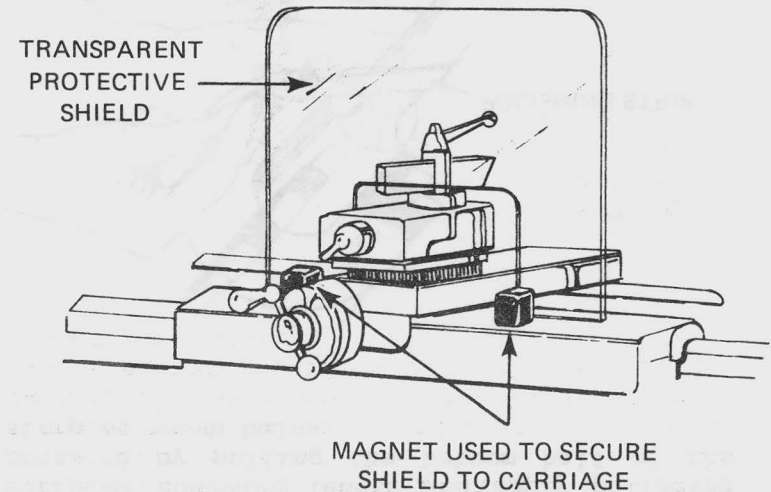
Safety Guidelines

1. Install removable protective shields that fit over lathe compounds. The shields should not require adjustments or tools when removing and installing.

Supplemental Information

1. Many protective shields on the market require adjustment when they are installed or reinstalled on lathes. Because of this, the adjustment mechanisms wear quickly and will not hold the shields in the proper position to protect the workers.

Below is one suggested design that requires minimal adjustments.



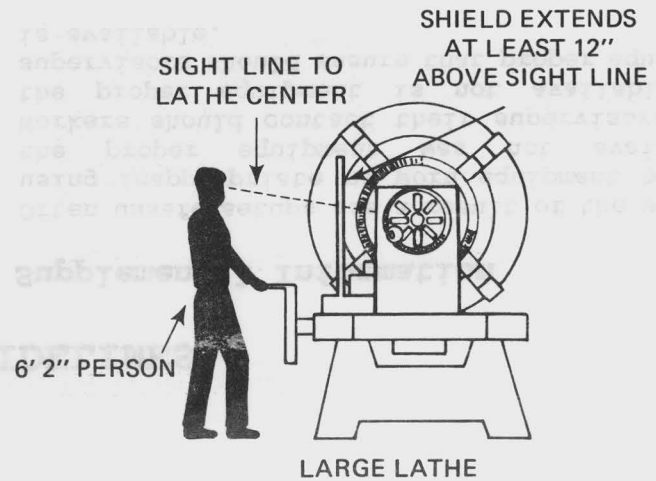
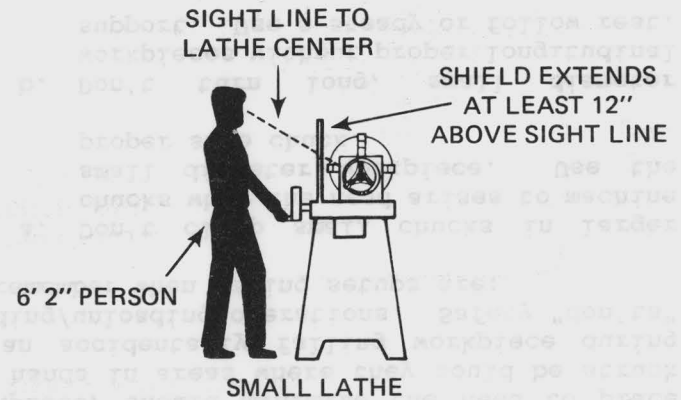
SPECIFIC SAFETY GUIDELINES 4

(Continued)

Safety Guidelines

Supplemental Information

The shield should be high enough to prevent chips from striking the face of a person standing in front of a lathe. A shield which extends 12" above the line of sight of a 6'2" tall operator should protect over 98% of the worker population.



SPECIFIC SAFETY GUIDELINES 5

Safety Guidelines

1. Provide workers with all necessary and correct setup equipment to safely secure the workpiece to the chucks or other holding devices.
2. Instruct workers, especially apprentices, on how to make setups that safely secure a workpiece to the chuck or other holding devices.

Supplemental Information

1. Often unsafe setups are a result of the workers using inappropriate or worn equipment because the proper equipment was not available. Workers should contact their supervisors when the proper equipment is not available and supervisors should ensure that proper equipment is available.
2. A safe setup, in addition to securing the workpiece, should minimize the need to place the hands in areas where they could be struck by an accidentally falling workpiece during loading/unloading operations. Safety "don'ts" to remember when making setups are:
 - a. Don't clamp small chucks in larger chucks when the need arises to machine small diameter workpiece. Use the proper size chuck.
 - b. Don't turn long, small diameter workpieces without proper longitudinal support. Use a steady or follow rest.
 - c. When cutting pieces from a single piece of feedstock, do not use long pieces of feedstock which extend beyond the feed side of the headstock unless the feedstock is supported longitudinally.
 - d. Don't turn unbalanced workpieces at high speed. Counter-balance irregular shaped workpieces as much as possible.
 - e. Don't attempt to support large heavy workpieces with small centers. Remember, the larger the workpiece, the deeper the workpiece center should be machined.

SPECIFIC SAFETY GUIDELINES 5

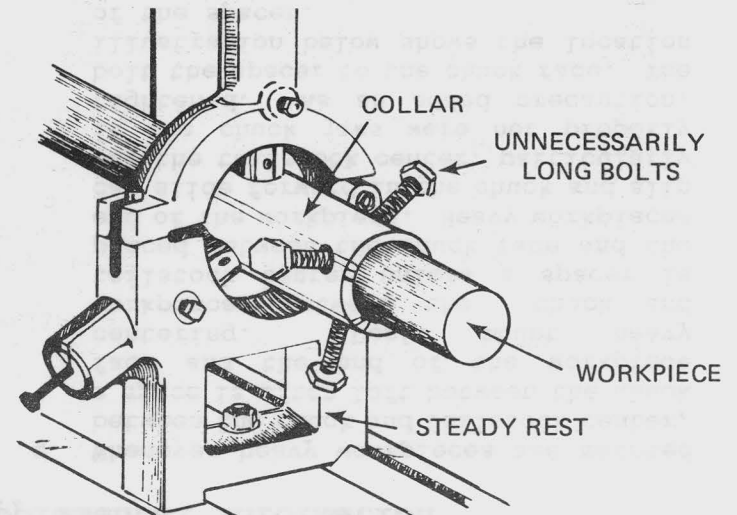
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Safety Guidelines

Supplemental Information

- f. It is often common to fabricate parts for making setups. Don't have long screws, bolts, pins, etc. protruding from parts that rotate with the workpiece. **ROTATING PROTRUSIONS ARE DANGEROUS.**

The drawing below illustrates an unsafe setup. The collar protects the workpiece from wearing against the steadyrest, but the long bolts are a hazard to the worker.



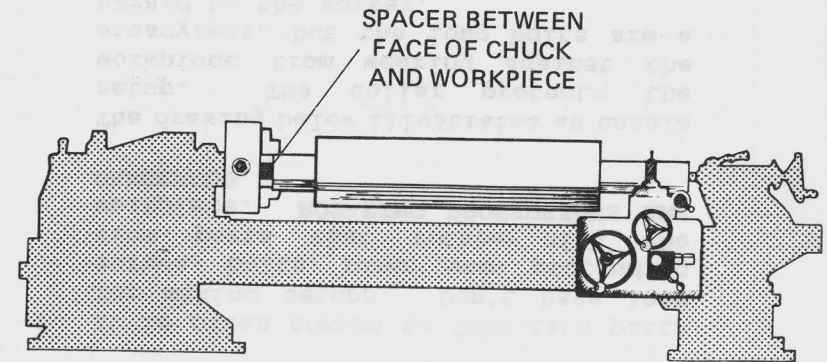
SPECIFIC SAFETY GUIDELINES 5

(Continued)

Safety Guidelines

Supplemental Information

- g. Whenever heavy workpieces are mounted between the chuck and tailstock center, a space is often left between the chuck face and the end of the workpiece centering. Don't mount heavy workpieces between the chuck and tailstock center unless a spacer is placed between the chuck face and the end of the workpiece. Heavy workpieces can slide forward in the chuck and slip off the tailstock center, particularly if the chuck jaws were not properly tightened. As an added precaution, bolt the spacer to the chuck face. The illustration below shows the location of the spacer.



SPECIFIC SAFETY GUIDELINES 6

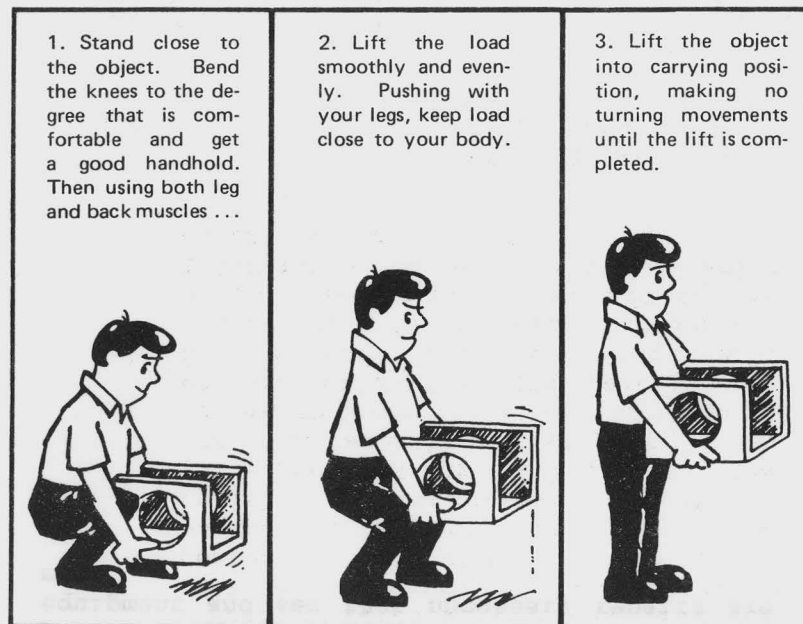
Safety Guidelines

1. Instruct workers to use hoists, materials handling equipment, etc. to lift and position feedstock, workpieces, and lathe accessories. For smaller objects instruct them in the proper methods of grasping and lifting workpieces and lathe accessories. **CAUTION WORKERS NOT TO OVEREXERT THEMSELVES.** See NIOSH's Work Practices Guide for Manual Lifting for further guidelines on manual materials handling⁸.

Supplemental Information

1. Workers should know how to lift workpieces and accessories using leg muscles. Often, not knowing proper lifting methods results in the workers lifting with their backs and sustaining injuries.

The drawings below illustrate the proper lifting method.



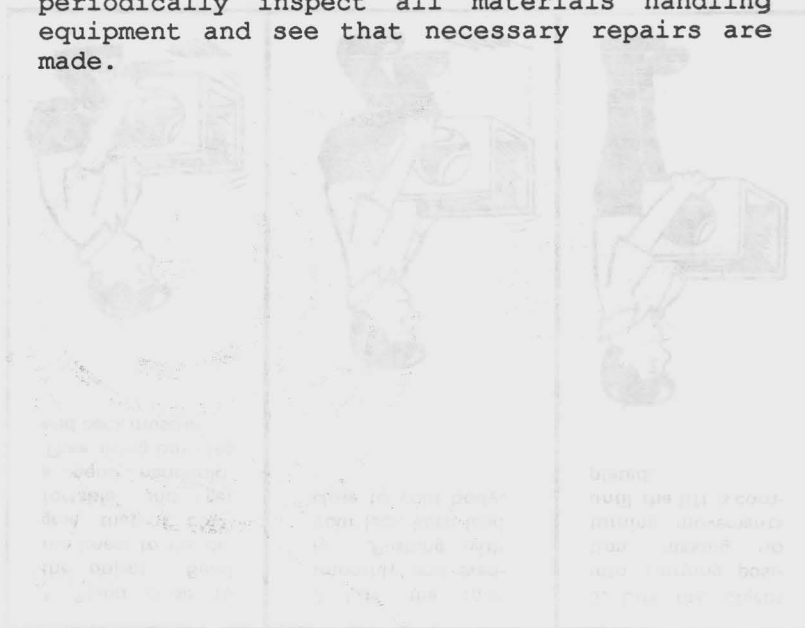
SPECIFIC SAFETY GUIDELINES 7

Safety Guidelines

1. Provide the proper materials handling equipment for lifting and transporting feedstock, workpieces, and lathe accessories. Maintain this equipment in working order.

Supplemental Information

1. Often materials handling equipment is available, but it sometimes is not in working condition because of broken or missing parts. Supervisors or safety personnel should periodically inspect all materials handling equipment and see that necessary repairs are made.



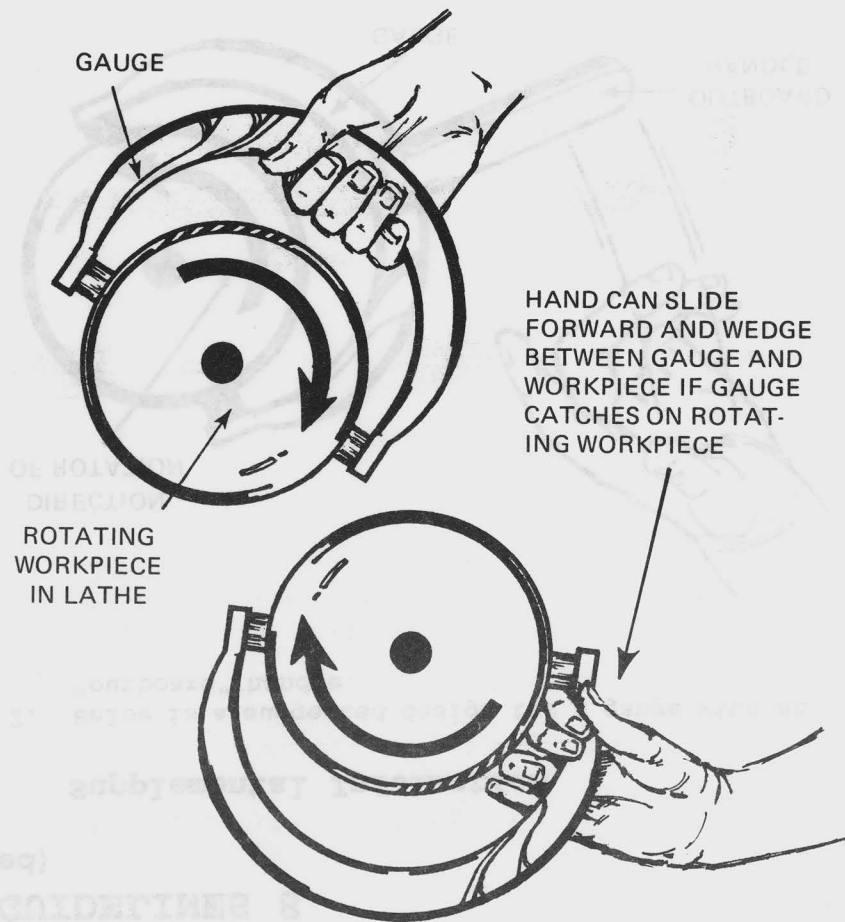
SPECIFIC SAFETY GUIDELINES 8

Safety Guidelines

1. When practical, a workpiece should be removed from the lathe for measurements. If a workpiece cannot be removed from the lathe for measuring, insist that workers switch off power and shift the clutch to neutral or open gear position.

Supplemental Information

1. Serious injuries have resulted when a worker attempted to measure a rotating workpiece or when a clutch accidentally engaged while a measurement was being taken. The drawing below illustrates the way a hand can become wedged between the rotating workpiece and gauge.



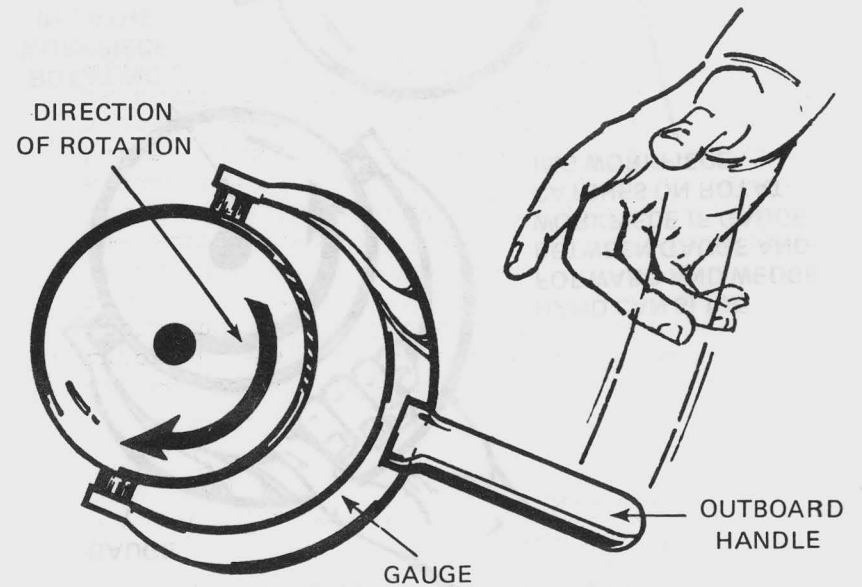
SPECIFIC SAFETY GUIDELINES 8 (Continued)

Safety Guidelines

2. As an added precaution, provide gauges with "outboard" handles that can slip from the worker's hand if caught on a workpiece that has accidentally started to rotate.

Supplemental Information

2. Below is a suggested design for a gauge with an "outboard" handle.



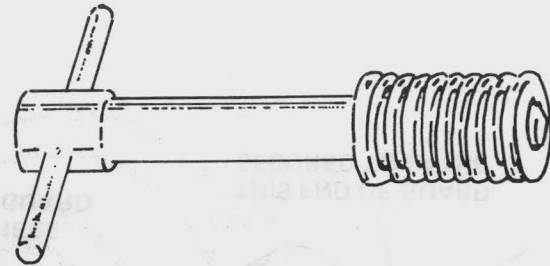
SPECIFIC SAFETY GUIDELINES 9

Safety Guidelines

1. Provide (and require that workers use) a spring-loaded chuck wrench that cannot inadvertently be left in the chuck.

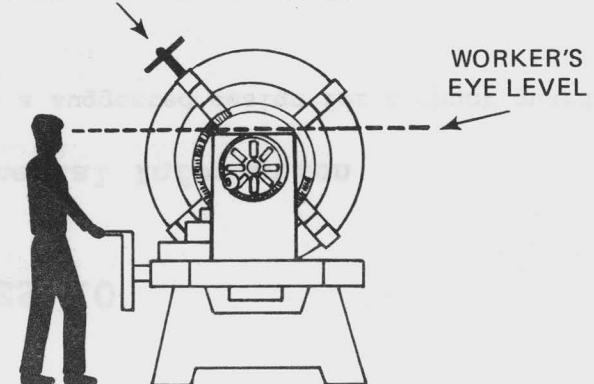
Supplemental Information

1. A spring-loaded wrench is one that will push itself out of the socket if the worker removes his hand from the wrench handle while the wrench is still in the chuck socket. Below is an illustration of a spring-loaded chuck wrench.



Spring-loaded wrenches are particularly important on all lathes used in production machining and on lathes fitted with large or small diameter chucks. In production machining, the highly repetitive nature of operations can lull the worker into becoming inattentive and forgetting to remove the chuck wrench before starting the lathe. On lathes fitted with large diameter chucks, a wrench inserted in the top socket of a large chuck can be easily overlooked since the wrench would be well above the worker's eye level.

CHUCK WRENCH ABOVE EYE LEVEL



WORKER'S EYE LEVEL

SPECIFIC SAFETY GUIDELINES 10

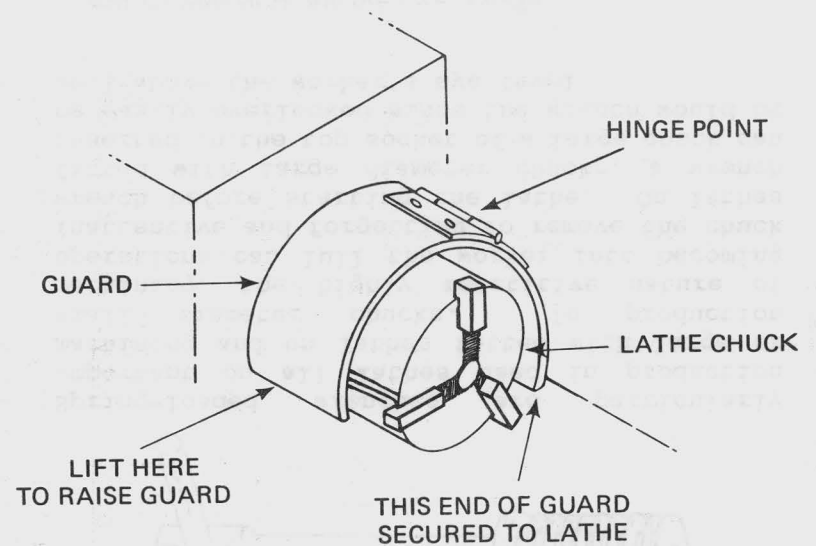
Safety Guidelines

1. Install guards or shields over chucks or other holding devices. Provide an interlock to prevent the lathe from being started without the guard being in the closed position. Jog buttons, that bypass the interlock, should be included for use during setups. When the guard is raised for setup, it should remain in a secure upright position until lowered.

In situations where workers do not continually adjust manually operated chucks or other holding devices, guards or shields can be used without causing undue inconvenience to the workers.

Supplemental Information

1. Below is a suggested design for a chuck guard.



Position the guard or shield high enough over the chuck to clear the chuck jaws when they are fully extended.

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