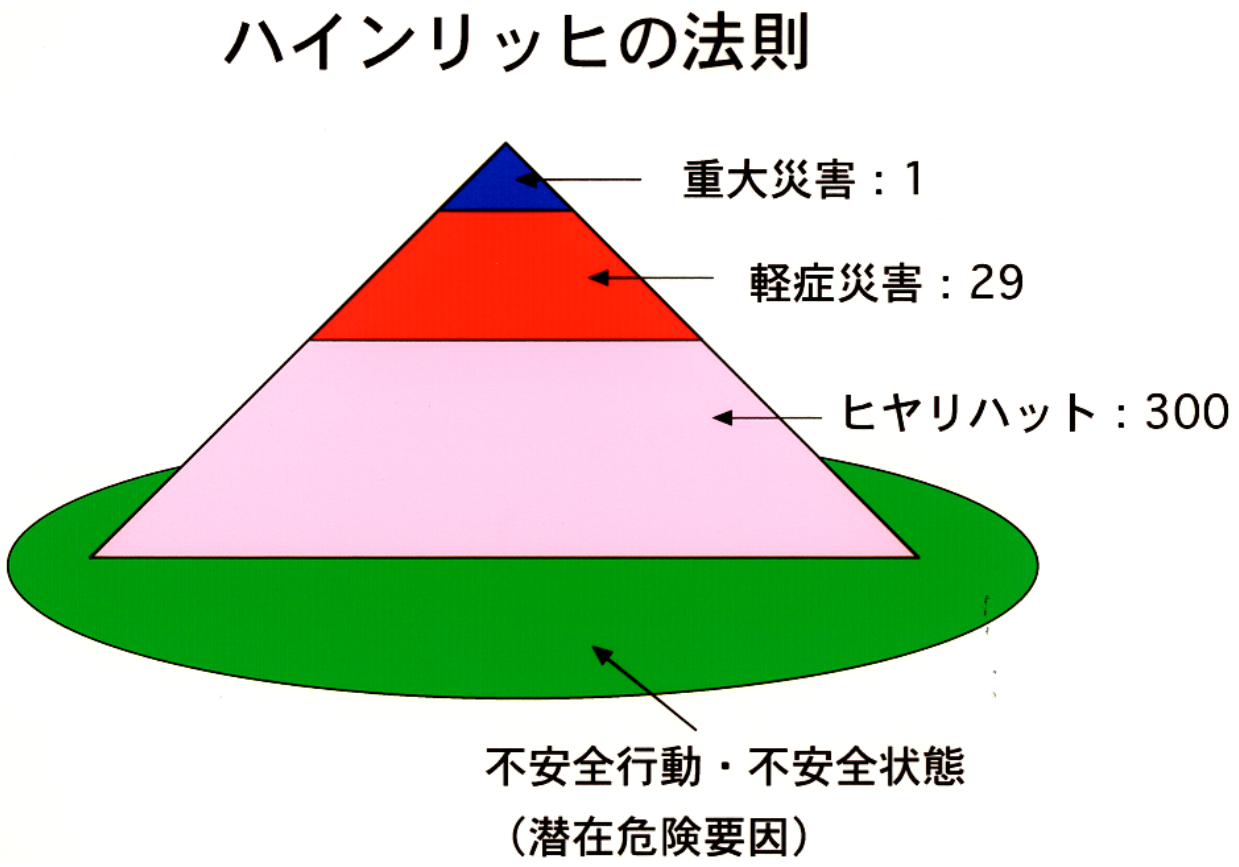
Safe Handling of Machinery

機械類の安全な取り扱い

A Good Lesson from Fields

Heinrich's law (Herbert William Heinrich, Pioneer of industrial safety in US)

that in a workplace, for every accident that causes a major injury, there are 29 accidents that cause minor injuries and 300 accidents that cause no injuries



Safe Handling of Machinery

(Workshop space in 電離気体実験施設)

Drill Press

Welding

Lathe

Grinder/ Abrasive Cut-Off Machine

General precautions in handling of machinery

1. Only operate machinery when you are adequate trained and are familiar with it.
2. Check the surrounding area before starting the machine.
3. If you perceive any abnormal conditions (noise, smoke, bad smells, heat, vibration, etc.), stop the machine immediately and contact your supervisor.
4. Stop the machine and switch it off before conducting cleaning, repairs, inspection, lubrication, etc. of the machine.
5. Ensure that rotating parts, such as gears, belts, shafts, and grindstones, are covered.
6. Do not stop machines that run on inertia by using your hands, feet, tools, or poles, etc.
7. If there is a power failure, turn off the main power switch (supply).
8. Do not reach across a rotating machine or over a workpiece to the other side.
9. When shutting down a machine, conduct a thorough inspection and then ensure that each part of the machine is completely returned to the stop position.
10. Remove all obstacles on the floor within the scope of operation because one might trip over them.

Seiri- Seiton

Sorting (整理), Setting-in-Order (整頓), Shining(清掃), Standardizing (清潔), Sustaining the Discipline (しつけ)

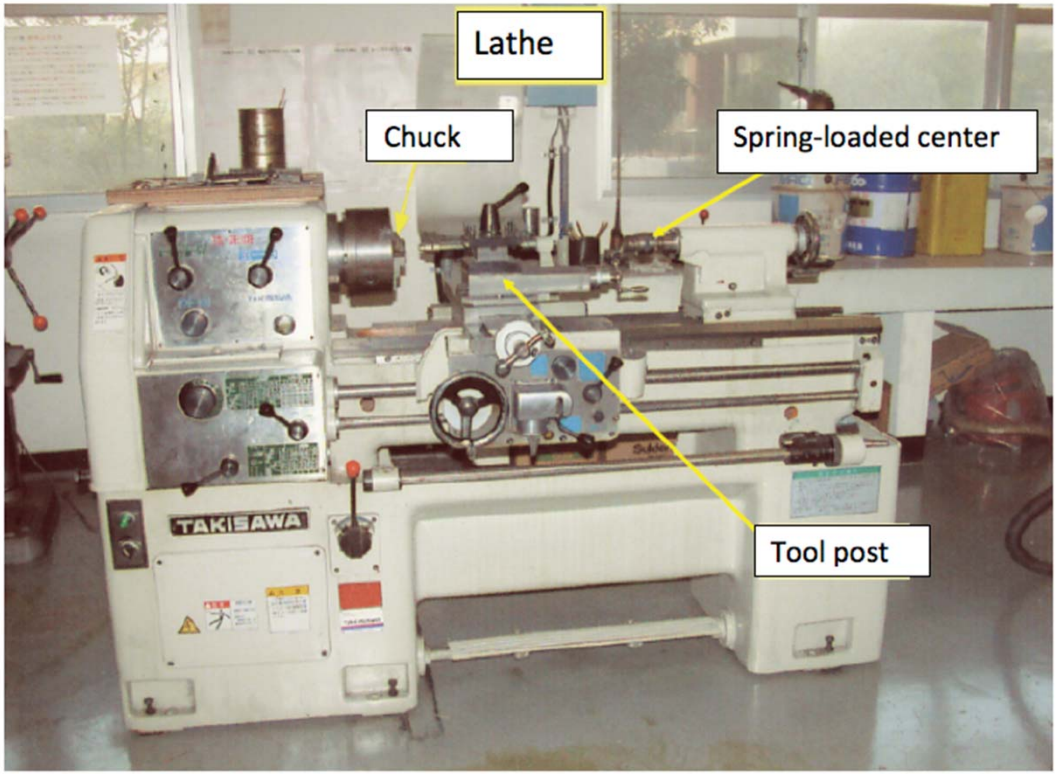
General precautions in handling of machinery

11. As a general rule, gloves must not be worn (particularly when using drilling machines and lathes, etc.)
12. Wear work clothes with fitted cuffs and hems and do not work with a towel, etc. Do not hang it from your waistband.
13. When applying cutting lubricant with a brush, ensure that the brush does not get entangled in the machine.
14. Wear safety glasses and a mask when doing machining.
15. Coating the machine or tool handles with an excessive amount of oil is dangerous because it significantly increases the chance of slipping.
16. When cutting, avoid bringing your face or hands too close to rotating parts.
17. Ensure that the machine is completely stopped before loading and unloading workpieces and tools, and before checking dimensions.
18. Remove shavings using a brush or pliers once rotation has stopped.
19. Shoes must be worn when working. Slippers and sandals are strictly prohibited.

Safe handling of lathe

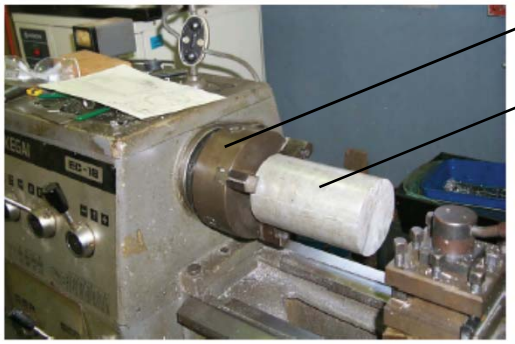
A lathe is a machine tool in which a cylindrical material is rotated and a blade-like cutting tool is applied to cut the material.

It is one of the most frequently used machine tools for cutting.

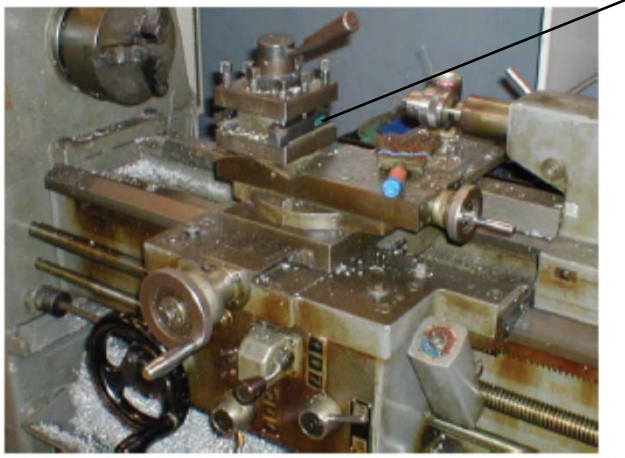


Safe handling of lathe

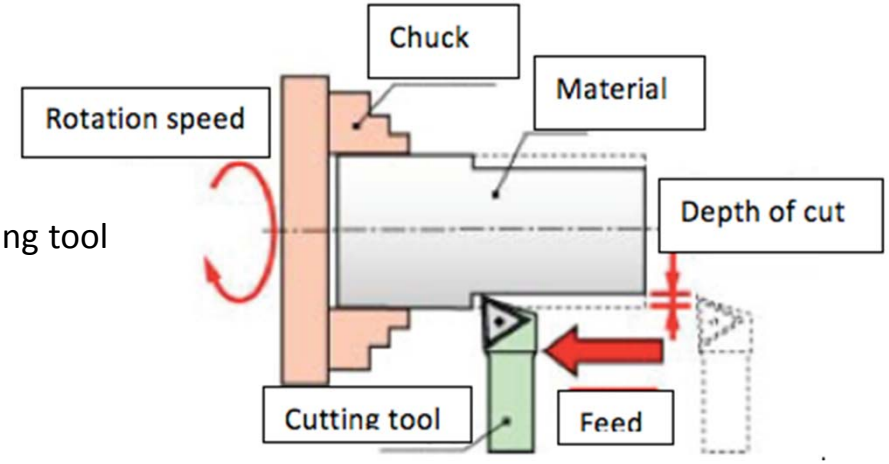
The material is held firmly in place in the lathe chuck. When the lathe is switched on, the chuck rotates. The table to which the cutting tool is fixed can be moved forwards or backwards or in a horizontal direction by operating the handles, and the tip of the cutting tool makes contact with and cuts the material according to this operation.



Clamping the material

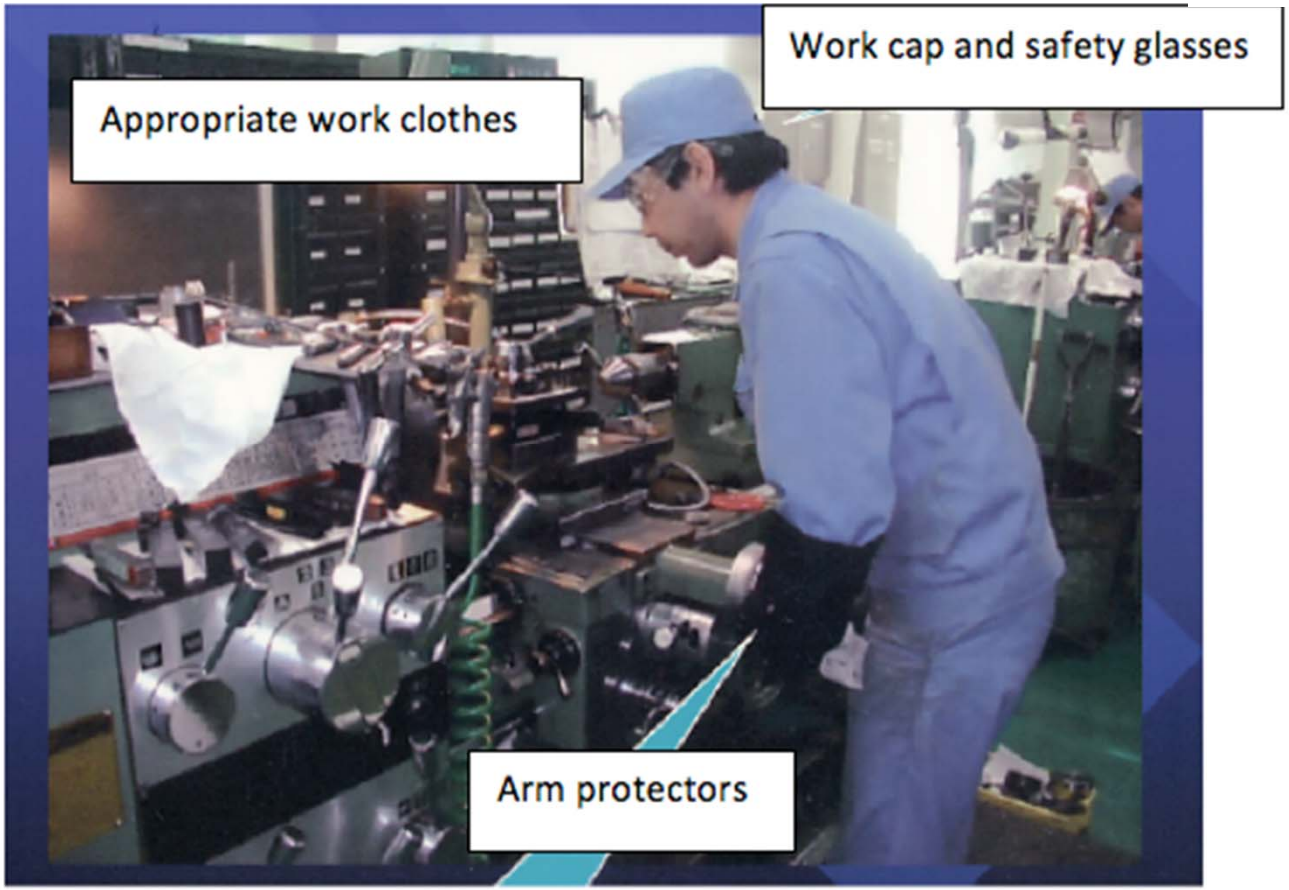


Cutting tool table



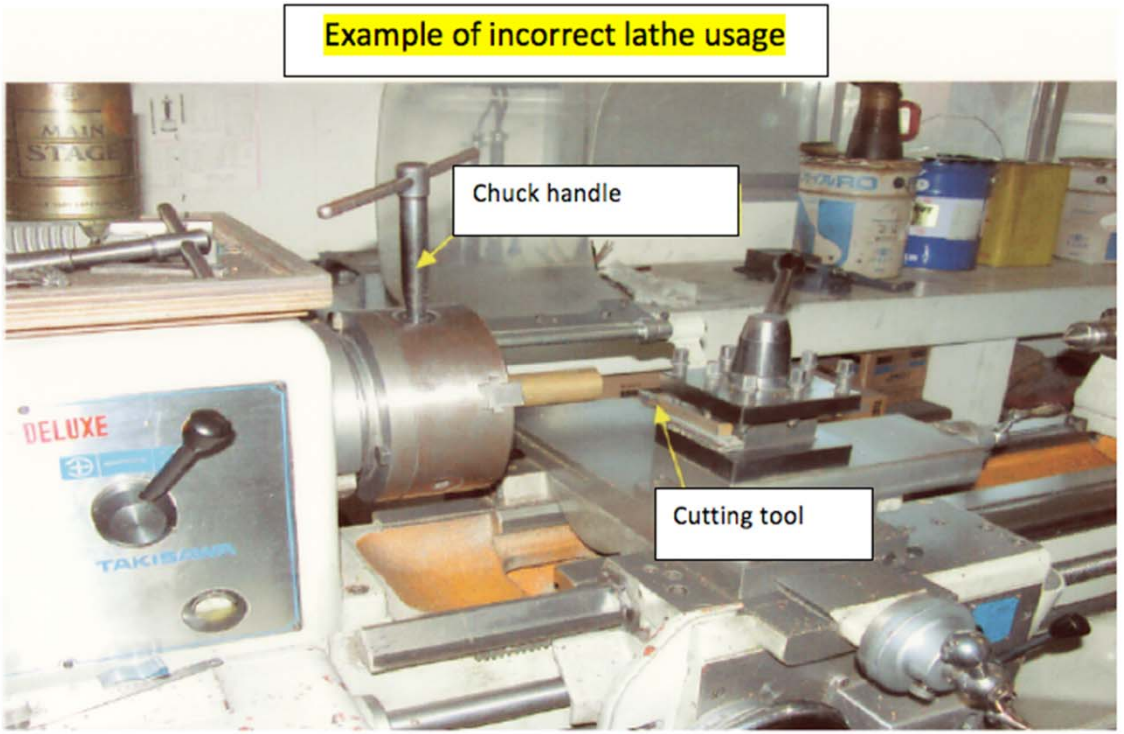
Safe handling of lathe

Clothes in handling of lathe



Precautions in handling of lathe

1. Check that all switches are off, and then turn on the main power switch.
2. Carry out inspection and apply lubricant prior to start-up.
3. Pay attention to the noise at start-up and also when the machine is running.
4. Check that the chuck handle is removed before starting rotation.

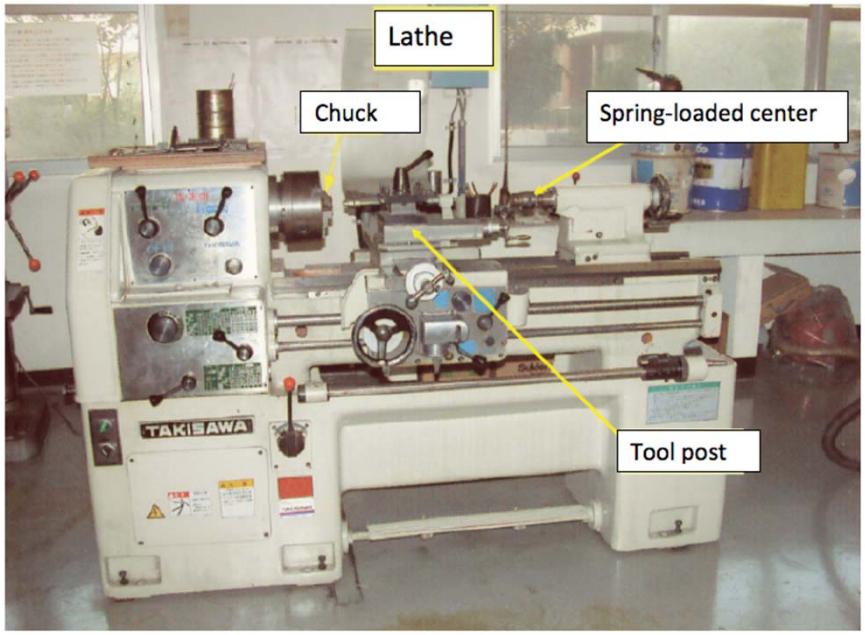


Voice & Gesture

Precautions in handling of lathe

5. Ensure that the workpiece is securely mounted in the chuck (continue to adjust the workpiece until it is centered).
6. Determine the correct spindle speed and feed rate prior to switching on the machine.
7. When cutting, be particularly careful that the automatic feed, feed bar and tool post, etc. Do not touch the rotating parts (install a safety device).
8. Do not stand within the turning circle of the chuck.
9. A long length of stock must not be inserted into the chuck. Instead, the stock must be cut to the required dimensions. A spring-loaded center must be used for long workpieces.
10. Do not use a cutting tool that will not cut

    (set the cutting tool once it is centered).



Handling of Drill Press

Machinery to male a hole (i.e. bench drill)

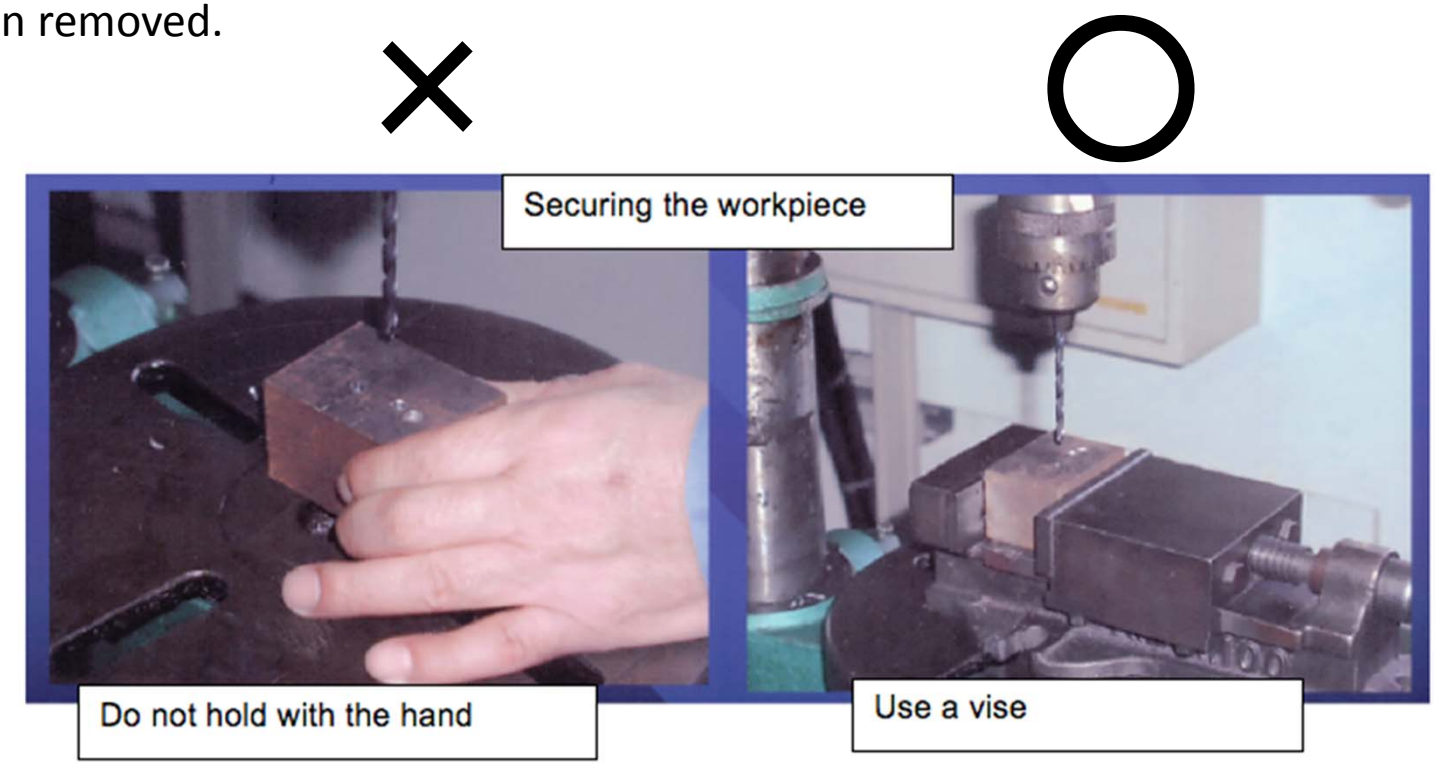
The vice should be used for the fixation of the target workpiece

Drill press

Safe Handling of Drill Press

Precautions

- After ensuring that all switches are turned off, turn on the main power switch.
- Adjust the table (to match the depth of the hole you intend to drill).
- The workpiece must be securely fixed to the table using a vise.
- Do not use a blunt drill.
- Ensure that the drill is securely chucked, and check that the chuck tightening tool has been removed.



Safe Handling of Drill Press

Precautions

- Set the appropriate rotation speed.
- Do not apply excessive force to the drill. (Keep the drill adequately lubricated).
- Be especially careful when you have nearly drilled through the workpiece because the drill bites into the workpiece easily at this stage.
- If the drill bites into the workpiece, the workpiece will start rotating with the drill. If this happens, switch off the drill press and free the drill once the main shaft has stopped completely.
- When drilling has finished, turn off all switches, remove and clean the tools and return them to their original storage area.

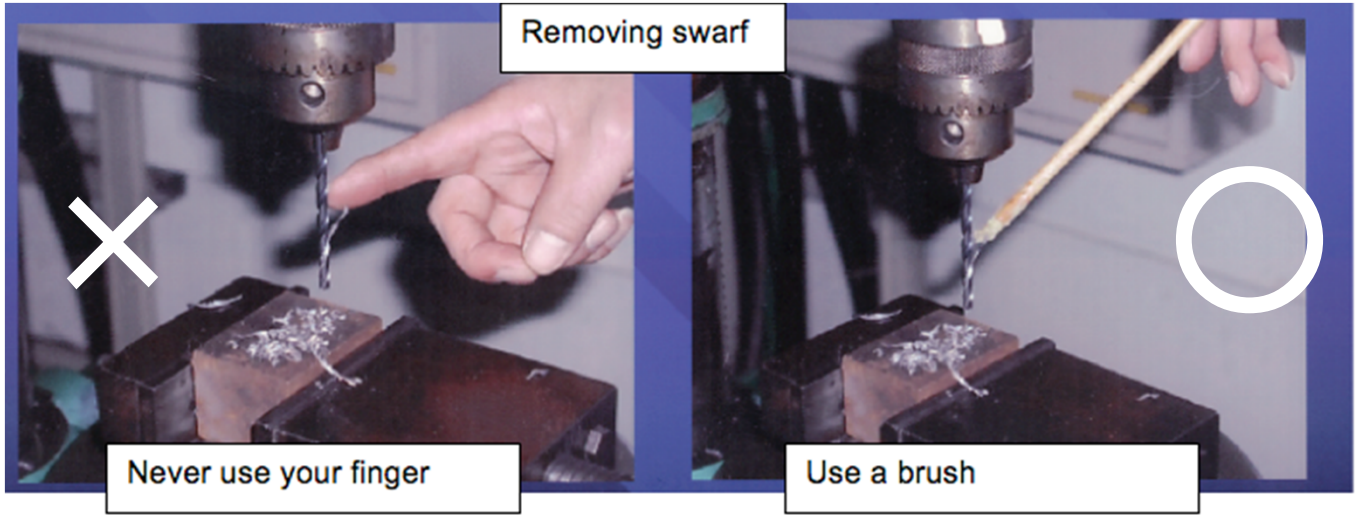
Safe Handling of Drill Press

Precautions

- Do not wear gloves in handling a drill press.

- Remove swarf (cut materials) using a brush.

Swarf is NOT touched with empty/Bare hands

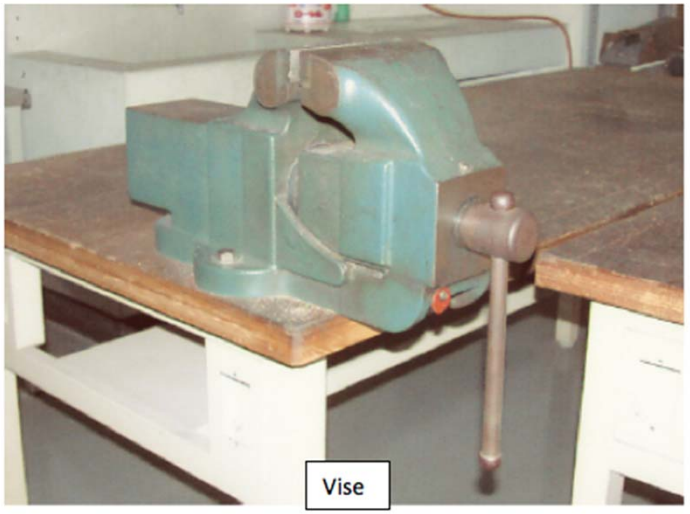


Safe Handling of Hand Drill

In addition to the precautions advised when using a bench drill, the following precautions should be followed.

- Install and use an earth leakage circuit breaker.
- Secure small workpieces in a vise for machining.
- Adopt a stable posture when using the drill. Avoid working in unstable locations, such as inconvenient, narrow, or high areas.
- Before drilling, mark the hole position with a punch.
- Do not use an unnecessarily long power cord.
- Ensure the drill is switched off when not in use.
- After finishing the work, clean up promptly.


Electric hand drill

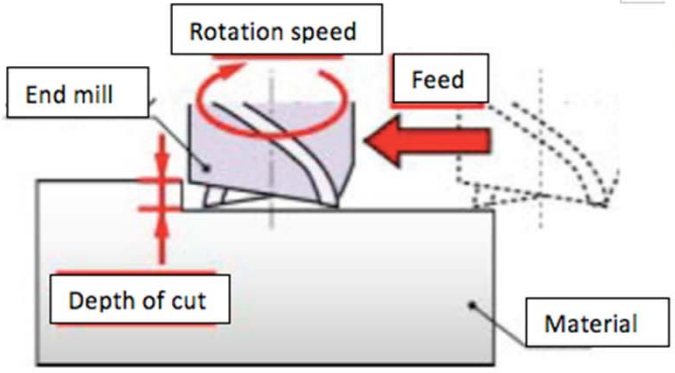

Vise

Seiri (整理), *Seiton* (整頓)

Safe Handling of Milling Machine

Milling machine

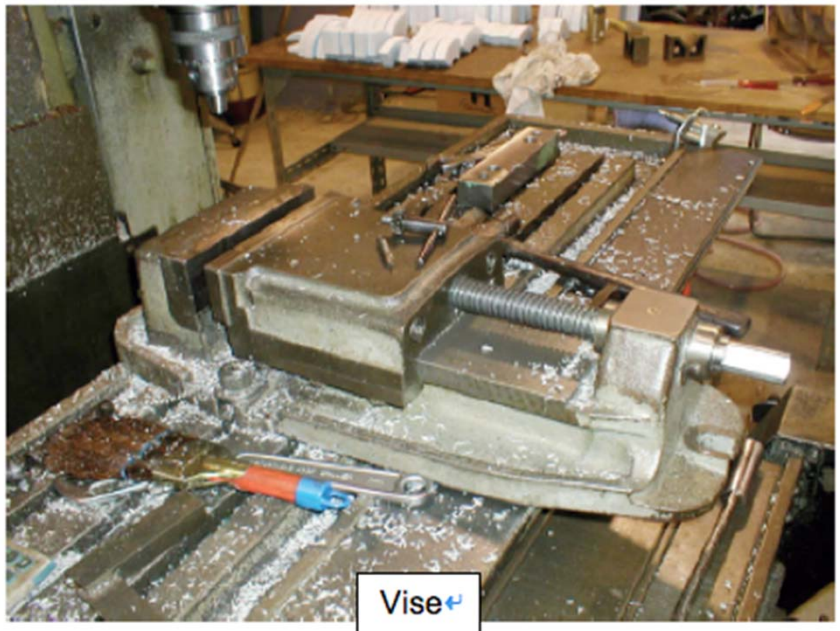
A milling machine is a machine tool that uses a rotary cutter to machine a material held in a vise. Cutter blades called drills or end mills are used as the tools. By operating handles, one can accurately move the clamped material in three directions: horizontal (x axis), frontward and rearward (y axis), and vertical (z axis).



Safe Handling of Milling Machine

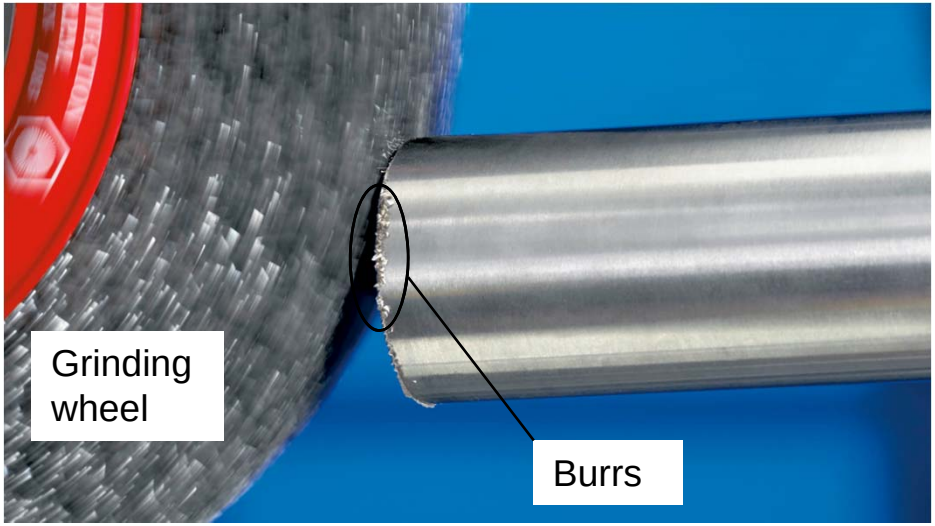
Precautions

1. If the milling cutter gets caught in the workpiece during operation and the machine stops, immediately turn off the power switch and seek instructions from an expert.
2. The workpiece should be securely fixed using a vice.
3. Do not apply an excessive moving speed of the vice.



Safe Handling of Grinder

A grinder is a machine tool that rotates a circular grindstone at a high speed. It is an essential machine for removing burrs from parts and tools, and for sharpening cutting tools.



Safe Handling of Grinder

Precautions

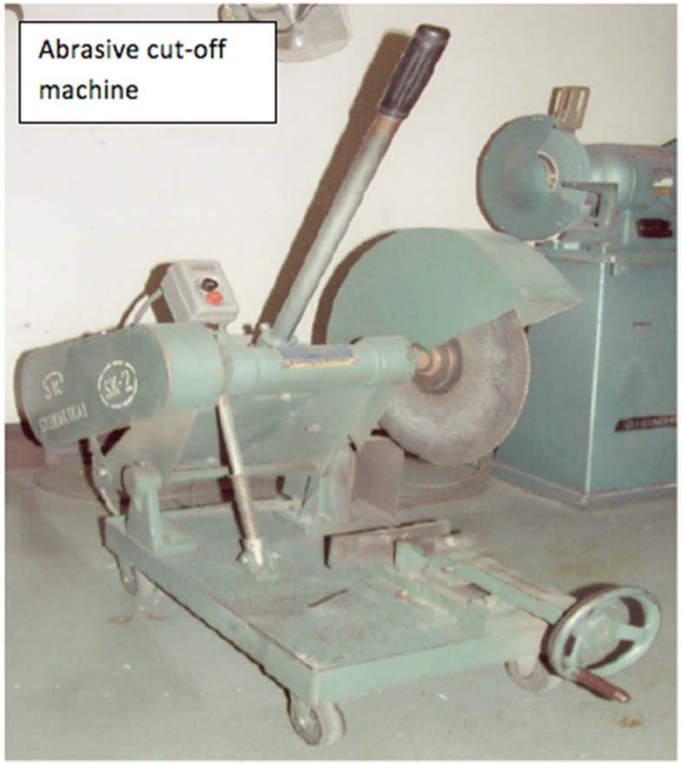
1. Ensure that the grinder is correctly assembled.
2. Do not use a cracked grinding wheel.
3. Run the grinding wheel without load before grinding to check for abnormal noises or vibrations.
4. Keep the grinding wheel dressed.
5. Start grinding when a constant speed has been reached.
6. Do not push the workpiece against the grinding wheel with excessive force.
7. The workpiece must not be moved away from the support base while grinding.
8. Take care to avoid getting burnt; the workpiece becomes hot during grinding.
9. When grinding, try not to stand in front of the grinding wheel.
10. It is advisable to wear safety glasses and a respirator.
11. Clean the grinder thoroughly after use.

Safe Handling of Abrasive Cut-Off Machine

With an abrasive cut-off machine there is a risk of the grinding wheel breaking and its fragments flying.

More care must be taken than when using a grinder.

1. Take care when storing the grinding wheel that it does not bend.
2. Before using the grinding wheel, check to make sure it does not have any damage, such as cracks.
3. When mounting the grinding wheel, sandwich it between thin paper on both sides and lightly tighten the flange. Bear in mind that the fixing bolt is a left-handed thread.
4. Before starting the cutting operation, run once idle and check whether there is any lateral run-out with the grinding wheel, and check the condition when cold water is applied.



Safe Handling of Abrasive Cut-Off Machine

5. Ensure that the safety cover is in place during the cutting operation.
6. When using a new grinding wheel, touch it against the workpiece lightly and familiarize yourself with the outer circumference.
7. Do not remove the workpiece while the grinding wheel is rotating.
8. After finishing your work, remove and store the grinding wheel. Tidy up the area.

Safe Welding

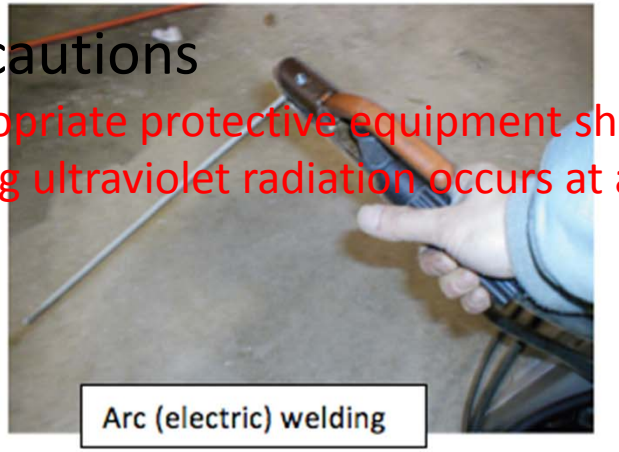
Welding is a process in which the joining portions of metal materials are melted and joined together using extreme heat.

Welding (gas/electric) should only be performed by qualified workers.

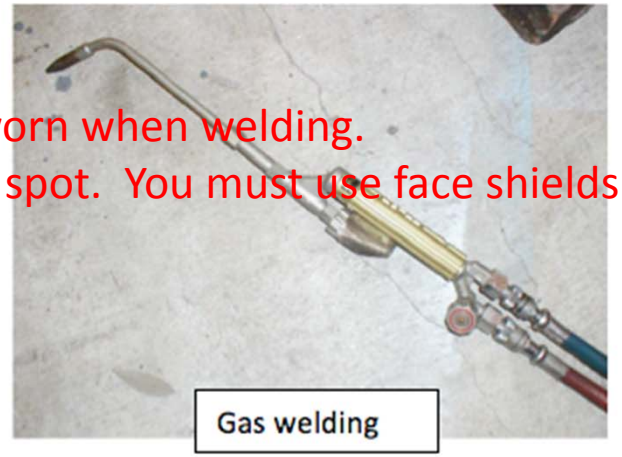
Precautions

Appropriate protective equipment should be worn when welding.

Strong ultraviolet radiation occurs at a welding spot. You must use face shields in welding.



Arc (electric) welding



Gas welding

Arc welding

Face shields (masks)

Materials Handling using a Crane and Hoist

Crane: A crane is a mechanical device for lifting loads and transporting them horizontally.

Hoist: A hoist is the device around which a rope or cable is wrapped.

Slinging work: Work that involves suspending loads and removing loads from a crane sling using a wire rope, chain, or other equipment.

Hoist crane

Materials Handling using a Crane and Hoist

For lifting loads heavier than 0.5 t, crane operation must be carried out by qualified personnel.

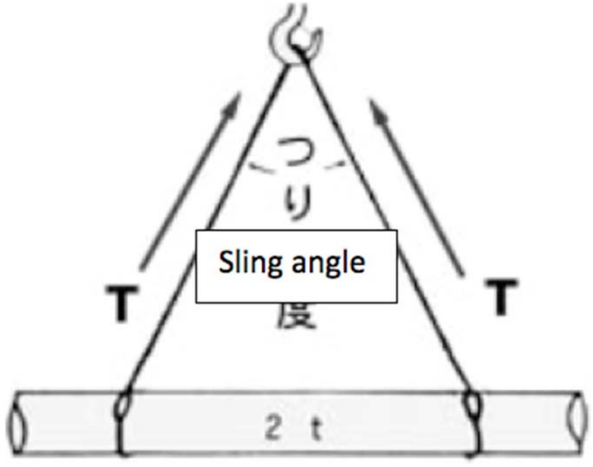
Precautions (for lifting loads lighter than 0.5 t)

1. Cranes should be operated by designated personnel.
2. Wear gloves, safety shoes, and a safety cap when working.
3. Inspect the crane, hook, cable clamp, and cable prior to use. Moreover, check the switch operation.
4. There should be adequate communication between the crane operator and operator responsible for slinging.
5. Do not lift an object in excess of the safe-working load.
6. When lifting, ensure that the hook is directly over the center of gravity of the load and lift slowly. Check that the cable is securely hooked on to the crane.

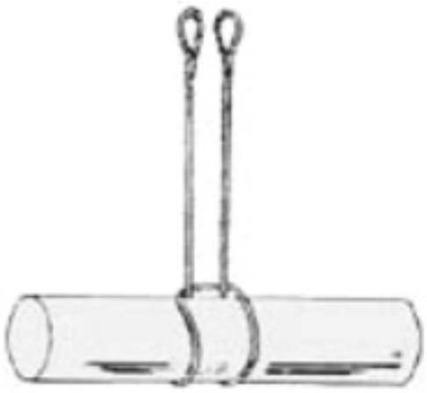
Materials Handling using a Crane and Hoist

Precautions in Slinging

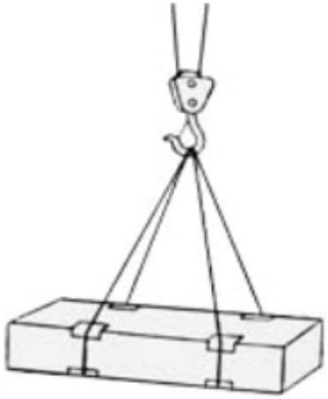
1. As a rule, the sling angle of the wire rope should be 60°. When this is not possible, the angle must not exceed 90°.
2. Do not suspend the load as shown in right-hand figure. The lifting load would be unstable.
3. When suspending an angular load, pad the load so that the wire is not damaged.

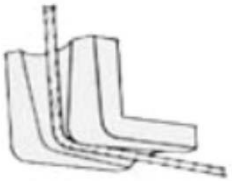


The sling angle should be within 60°



Unstable lifting load.





Pad angular goods, finished goods, and slippery goods.

Finally...

If you want to use a machinery , contact your supervisor first.
Do not use it alone.

Lab HP : www.phe-kyudai.jp

Today's PPT Documents (PDF) : HOME/classinfo

http://www.phe-kyudai.jp/pdf/lec/Machinery_JPN.pdf