

Machine Shop Safety Handbook

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THE SAFETY RULES

1. To access Holmes 348 and Holmes 140/140a you must have a current Safety Sheet on file.

2. No one works alone.

At least two team members must be in the lab

3. Never work when you are impaired.

This includes when you are too tired, stressed or hurried to work carefully.

4. If you cannot do a job safely in this shop, don't do it.

There are limits to what we can build here.

5. Always wear closed-toe shoes in the shop.

*Tools, chips and fixtures are sharp, and often hot. Shoes will help protect your feet from injury
Leather shoes are preferred when welding.*

6. Eye protection is essential.

*Eye protection must be worn at all times in H140, H140A and H348
Prescription glasses must be ANSI compliant and have side shields if they are to be worn as safety
glasses.*

7. Long pants must be worn

*Long pants are required to be worn in H140, H140A and h348. If they are kept in a locker you must
put them on when entering.*

8. Remove or secure anything that might get caught in moving machinery.

Rings, necklaces, long hair and loose clothes can get caught in tools and pull you in.

9. Keep your hands away from sharp and rotating tools.

The OSHA standard is a 4" zone from the cutting surface.

10. Dust, chemicals and smoke can be dangerous

Work in well-ventilated areas, minimize contamination and use appropriate protective equipment.

11. If you're unsure about the safe operation of a tool or any aspect of a job - ask for help!

Have shop staff check you out on a tool the first time you use a tool you are unfamiliar.

12. Clean up after yourself.

*Before you leave the shop each day all tools must be returned to the toolbox, the machine cleaned
and wiped down and the floor swept.*

Information about the Holmes 348 Shop

The Student Machine Shop in Holmes 348 or the assembly area in Holmes 140/140A is available to Mechanical Engineering students, staff and faculty working on University projects. Everyone must read this safety handout and attend a safety workshop before using the tools in the shop.

To have a current ME Safety Sheet a person must:

- Have read the UH ME Safety Handbook and taken the online quiz
- Attended a safety briefing
- Done the hands on training for the equipment in Holmes 348

The goal of this handout is to summarize the risks that are inherent in metalworking and to provide some guidelines for working safely. It is **not** intended to be a machining training manual. The first step in preventing personal injury or machine damage is to make sure that you know how to operate the equipment you will be using correctly.

If you are unsure - ASK!

Because it is a communal area, used by so many people, it is important to keep the shop clean and orderly. This means that every user must clean the machines and work areas as they move from machine to machine. Put away all tools and material before leaving the shop. Counter tops and tables must be kept clear.

Inattention, hurried work, horseplay, bad judgment, fatigue, improper clothing, defective tools, and poorly secured workpieces cause most accidents. Avoid accidents by following all of the rules in this handout and asking for help if you are unsure about the safest approach.

Disregarding shop rules, working unsafely or leaving a mess will result in suspension of shop privileges.

These rules apply to the entire shop area in Holmes 348 and the project assembly area in Holmes 140/140A

In an Emergency:

Call 956-6911 in an emergency. The shop in H 348 and the Assembly Area in H140/H140A have emergency phones installed at central locations. When you lift the receiver you will be in contact with Public Safety dispatch.

Shop Hours:

Regular hours: M-F 9:30-12:00, 1:30-4:30. Access to the student shop may be limited during scheduled classes, and holidays.

Senior design teams have access to work on their senior projects from 6am till Midnight. Only senior design projects may be worked on during non-shop hours. Only senior design team members may be in the labs during non-shop hours.

General Safety Guidelines

- **Do not attempt to remove foreign objects from the eye or body.** Report to the student health service for medical treatment. If chemicals get in the eye(s), wash eye(s) for 15 minutes in an open flow of water before proceeding for medical treatment. Notify campus security at 956-6911.
- **Avoid excessive use of compressed air** to blow dirt or chips from machinery to avoid scattering chips. Never use compressed air guns to clean clothing, hair, or aim the gun at another person.
- **Machines must be shut off** when cleaning, repairing, or oiling.
- **Do not wear loose clothing**, jewelry, gloves, etc. around moving or rotating machinery.
- **Long hair must be tied back** or covered to keep it away from moving machinery.
- **Hand protection** in the form of suitable gloves should be used for handling hot objects, glass or sharp-edged items only when not operating machinery.
- **Wear appropriate clothing** for the job (i.e. do not wear short sleeve shirts when welding).
- **Do not work in the shop** if you are tired or in a hurry - this almost always ruins the work, and often results in injury.
- **Never indulge in horseplay** in the shop areas.
- **Do not drink alcoholic beverages before or during work in the machine shop area. Do not bring food or snacks into the shop.**
- **Think through the ENTIRE** job before starting. Ask for help if you have questions.
- **All machines must be operated** with all required guards and shields in place.
- **Before starting a machine**, always check it for correct setup and always check to see if machine is clear by operating it manually, if possible.
- **Remove chips** and shavings with a brush, hook, or special tool from the work area.
 - **Never use your hands to clean cuttings - 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.
 - **Never use a rag near moving machinery.**
- **Use a soft faced hammer.** A hard hammer should not be used to strike a hardened tool or any machine part.
- **Keep the floor around machines clean**, dry and free from trip hazards. Do not allow chips to accumulate.
- **Heavy sanding**, sawing, grinding and painting should only be done in well-ventilated areas. Use a dust masks.
- **Follow precautions** listed in the SDS when working with solvents, paints, adhesives or other chemicals.
- **Use the PPE** that is required for the chemical you are using.
- **Check the power cords** and plugs on portable tools for damage before using them.
- **Always store** oily rags in an approved metal container.

Drill Press Safety Guidelines

- **Wear eye protection**
- **Run drill at correct RPM** for diameter of drill bit and material. Use the chart posted on the wall as a guideline for the correct RPM.
- **Hold work in a vise** or clamp to the drill table no matter the material or size of drill bit.
- **Always try to support part** on parallels or a backing board when drilling thru material.
- **Inspect the drill bit** before using. Don't use a dull or cracked drill.
- **Always remove** the drill chuck key or, the drill drift from the spindle **immediately after using it.**
- **Never place taper shank tools in a drill chuck.** Only straight shank tools such as standard drills can be clamped in chucks.
- **Always clean drill shank** and/or drill sleeve, and, spindle hole before mounting.
- **Use a correctly ground drill bit** for the material being drilled. Shop personnel can help select the correct bit.
- **Use the proper cutting fluid** for the material being drilled. Ask the shop staff about the appropriate fluid for the material you are machining.
- **Plexiglas and other brittle plastics can be difficult to drill.** Ask the shop superintendent for advice on drill and coolant selection when drilling these materials.
- **Do not drill with too much pressure.**
- **Remove chips with a brush,** never by hand.
- **When drilling a deep hole withdraw the drill bit frequently to clear chips and lubricate the bit.**
- If the drill binds in a hole, stop the machine and turn the spindle backwards by hand to release the bit.
- **Ease up on drilling pressure** as the drill starts to break through the bottom of the material.
- **Remove taper shank tools from spindle or sleeve with a drill drift and hammer.**
- Lower the drill spindle close to the table when releasing the drill chuck or taper shank drill to reduce the chance of damage should they fall onto the table.
- **Never try to stop the spindle with your hand.** Let the spindle stop of its own accord after turning the power off.
- **Never clean a machine while it is in motion!!**

Lathe Safety Guidelines

- **Make sure that the chuck, drive plate, or, faceplate is securely tightened onto the lathe spindle.**
- **When removing the chuck, drive plate, or faceplate do not use machine power.**
- **When installing the chuck, drive plate, or faceplate do not use machine power.**
- **Move the tool bit a safe distance from the collet** or chuck when inserting or removing work.
- **Don't run the machine faster than the proper cutting speed** - consult a speed and feed table to determine the best speed.
- **Set tool holder to the left side of the compound** slide to prevent the compound slide from running into the chuck or spindle attachments.
- **Always clamp the toolbit as short as possible** in the toolholder to prevent it from breaking or chattering.
- **Make sure that the toolbit is sharp** and has the proper clearance.
- When filing on work revolving in the lathe, file left handed to prevent slipping into the chuck.
- **Never use a file without a handle.**

- **Make sure tailstock is locked in place** if work is turned between centers
- **Do not grasp or touch chips or turnings** with your fingers, remove them using a blunt instrument.
- **Turn off the lathe before clearing chips**
- **Set the toolbit on the centerline of your work.**
- Do not cut work completely through when turning between centers.
- **Remove chuck key from chuck immediately after using.**
- Turn chuck or faceplate through by hand before turning on the power to be sure there is no binding or clearance problem.
- **Stop the machine before taking measurements.**
- **Remove cutting tool** from the tool post and tailstock before cleaning the lathe.
- **Wear eye protection.**

Milling Machine Safety Guidelines

- **Wear eye protection.**
- **Work must be clamped securely in a vise**
- **Vise must be clamped tightly to the table**, or, work must be clamped securely to the table.
- **Do not climb cut** more than .005in
- **Make sure cutter is rotating in the proper direction** before cutting material.
- Before running machine the spindle should be rotated by hand to make sure it is clear for cutting.
- **Make sure the power is off before** changing cutters.
- Always use the proper cutting fluid for the material being cut.
- **Never run the machine faster** than the correct cutting speed.
- Make sure that the machine is fully stopped before taking any measurements.
- Always use cutters which are sharp and in good condition.
- Don't place anything on the milling machine table such as wrenches, hammers, or tools.
- **Always stay at the machine** while it is running.
- **Do not take too heavy a cut** or use too rapid a feed.
- **Remove the collet tightening wrench immediately after using it.**
- If at all feasible rig a guard or shield to prevent chips from hitting other people.
- Use the milling machine spindle brake to stop the spindle after the power has been turned off.
- **Before cleaning** the mill remove cutting tools from the spindle to avoid cutting yourself.

Band Saw Safety Guidelines

- **Wear eye protection.**
- The upper guide and guard should be set as close to the work as possible, at least within **1/4 inch**.
- **Check the speed table** for the material that you are cutting. Do not run the band saw too fast or the blade will wear out quickly.
- **Use the proper pitch blade** for the thickness of the material to be cut. There should be at least 2 teeth in the material when cutting aluminum and three teeth when cutting steel.
- **Examine blade before installing.** Check for cracks; do not install a cracked blade.

- **Immediately shut off the power** when the band breaks. Stand clear until the machine has stopped.
- If the saw stalls in a cut, turn the power off and reverse the blade by hand to free it.

Grinding Safety Guidelines

- **Wear safety shields and safety glasses (double eye protection) when using a bench or pedestal grinder.**
- **Do not grind aluminum.**
- **Abrasive wheel machinery shall not be operated without the appropriate guards in place.**
- Tool rests on bench or pedestal grinders shall be set no more than 1/16 inch from the wheel.
- **Never use a wheel that has been dropped** or received a heavy blow, even though there may be no apparent damage. Such wheels may be weakened or unbalanced enough to fly apart on startup.
- **Report to the area supervisor immediately any cracked, broken or otherwise defective wheels.**
- Have the area supervisor mount and balance new wheels.
- **Stand to one side when starting a grinding machine.** Damaged wheels will sometimes fly apart, and this is most likely to happen when the machine is being started. Stand to the side so that you will not be in-line with the debris.
- **Do not grind on side of wheel** unless wheel is specifically designed for such use.
- **Hold work securely** while grinding, use the tool rest to support the work when off-hand grinding on bench or pedestal grinders.
- **Do not use excessive pressure** while grinding.
- **Keep the grinding wheel dressed.** Dressing a small amount frequently is better than having to dress a lot later and will allow the wheel to cut faster, cooler and with a better surface finish. Dressing is cleaning and smoothing the surface of the grinding wheel.
- **Grinders are for grinding steels and stainless only.**

Table Saw Safety Guidelines

- **Wear eye protection.**
- **Special training is required before using the table saw.**
- You may not operate it without permission from the shop supervisor.
- Stand to one side, never directly in line with, of work being fed through the saw.
- **Use the proper blade for the material** and type of cut. Do not use a rip blade for cross cutting, or, a crosscut blade for rip sawing. Do not use a plywood blade for anything but plywood.
- **Inspect the blade before using it,** to make sure it is the proper blade and is sharp and free from cracks.
- **Never allow your fingers to get near the blade when sawing.** Use a pusher stick to rip narrow pieces of stock. Don't use pusher stick to remove scrap. For scrap removal, shut off machine and wait until blade stops, then remove scraps.
- **Appropriate guards must be in place at all times.** Never remove the blade guard. Ask one of the shop personnel for help if you think the guard is in the way.
- **If the piece of material you are cutting is large, get someone to assist in tailing-off for you.** Never try to do it alone. Tailing off refers to supporting a large workpiece by supporting it underneath with your hands.
- **If you are tailing-off for someone else let them guide the work through the saw.** You should just support the work without influencing the cut.

- **Never reach over the saw** to obtain something from the other side.
- When shutting off the power, never attempt to stop the saw quickly by shoving anything against the blade. Make sure the saw has stopped before leaving it.
- **Never make any adjustments to the saw while it is running.** Turn off the power, unplug the power cord and make sure the saw is completely stopped before attempting to adjust it.
- **Do not allow material to collect on or around the saw table. Sweep up sawdust and material scraps regularly** while working to minimize chances of slipping or stumbling.
- Make sure that you clean up thoroughly around the saw before leaving the area. If you don't you could be the cause of someone else having an accident.
- **The circular blade of the table saw should be set to 1/8 inch above the work.**

Power Hand (Skill) Saw Safety Guidelines

- **Unplug the tool** before making any adjustments.
- Before using any power tool, inspect it to make sure the cord is not damaged in any way, that the ground pin is intact, and that the blade is sharp and undamaged.
- **Do not use the saw in a wet area.**
- Do not run the extension cord across walkways where people might trip over it or where the cord may be run over and damaged.
- Keep your head out of the path of particles thrown out by the blade. Wear eye protection.
- **Disconnect the power cord** before cleaning, changing blades, or making any adjustments to the saw.
- When it is necessary to raise the guard for certain types of cuts, use the guard lever.
- Never wedge, wire, or otherwise jam the guard to prevent it from working. **This is a particularly dangerous practice and will cause your permission to work in the machine shop to be revoked immediately!!!**
- Wait until the saw stops before lifting it from a cut.
- Before setting the saw down, make sure the guard is closed, as the blade may still be turning.
- Don't carry the saw with your fingers on the switch trigger.
- Don't pull the saw backwards in a cut if you can avoid it.
- Use the proper blade for the type of cut to be made.
- Do not use the cord to move or drag the saw.
- Do not use the power hand saw for cuts if you cannot keep a firm and secure grip on the saw and the material being cut. A hand saw is still the best for some kinds of work and often faster.
- Before cutting small workpieces shop personnel should be consulted.
- Adjust the depth of cut 1/8" greater than the material thickness.

Disc and Belt Sander Safety Guidelines

- **Wear eye protection.**
- **ALUMINUM DUST IS EXPLOSIVE**
- **Do not sand steel or stainless on the disc and belt sander. A spark into the dust collector may cause it to explode.**
- **Do not operate sanders without the guards in place.**
- On the disc sander always use the downward motion side of the disc to sand. Never the upward motion side as this can throw your part upwards with tremendous force.
- Always attempt to place your work against the rest on the disc and belt sanders.
- On the horizontal belt sander, always sand, so that the belt motion is away from you.
- **Do not operate machines with torn or ripped belts or disks.**
- **Do not sand any material that will give off a dangerous dust. Such materials as beryllium or copper beryllium alloys must not be sanded or filed. Asbestos must not be sanded. Asbestos is an ingredient of brake shoes and pads.**

Welding Safety Guidelines

- **Shop staff approval is required before using any welding equipment.**
- Welders, assistants, and anyone else in the welding area shall wear glasses or shields of recommended shades during welding operations.
- **The welder is responsible for erecting a screen around the welding area** to protect other personnel in the shop from eye injury.
- **Inspect all welding equipment to be used**, prior to each use, for possible damage.
- **Avoid handling oxygen bottles with greasy hands, gloves or rags.** Fatal explosions have resulted from this cause. (There are currently no oxygen bottles in H140)
- **Always strap tanks to a welding cart or a fixed object.** Never allow a gas cylinder to be free standing.
- **Replace the safety cap** on all cylinders when not in use.
- Make sure work and/or work table is properly grounded when arc welding
- Do not arc weld in a wet area.
- **Be alert to possible fire hazards.** Move the object to be welded to a safe location, or, **remove all flammable materials from the work area.**
- **Never weld in the same area where degreasing or other cleaning operations are performed.**
- **Keep suitable fire extinguishing equipment nearby** and know how to operate it.
- **Shut off the cylinder valves when the job is completed, release pressure from the regulators by opening the torch valves momentarily and back out regulator adjusting valves. Never leave the torch unattended with pressure in the hoses.**
- **Utilize all protective equipment and clothing.** Do not arc weld with any part of the body uncovered, the arc light is actinic light (excessive ultraviolet) and will cause burns similar to severe sunburn.
- Never weld inside drums or enclosed spaces without adequate ventilation, or, the use of airline respirators or self-contained breathing apparatus.
- Check the ventilation system before starting to weld and periodically thereafter to insure adequate performance. **Welding fumes should not be allowed to get into the rest of the shop working areas.**

- **Never cut or weld any container that has held explosive or flammable materials.** Use prescribed methods for cleaning or flooding.
- **Never use wrenches or tools except those provided or approved by the gas cylinder manufacturer** to open valves. Never use a hammer to open or close valves.
- Abide by any other safety measures required for each particular type of welding.
- Allow for proper ventilation when brazing or soldering. The fluxes are acidic and toxic.
- **Do not weld on painted, galvanized or greasy, oily metals.** Not only can the fumes be toxic, but the welds will not be satisfactory and will fail in use.

Safety Guidelines for Working with Solvents, Resins and other Chemicals

- **Learn about the chemicals that you are planning to use before opening them. Read the instructions and SDS sheet. Consult shop staff or EH&S if you have any questions.**
- **Seek Insr**
- Use water-based cleaners instead of solvents where possible.
- Avoid skin contact. Wear latex gloves.
- **Work in a fume hood** or in a well ventilated area.
- Do not use solvents around hot metal surfaces and flames.
- Do not smoke or light flames in areas where solvents are used and stored.
- **Report and clean up any spills immediately.**
- Only use solvents in well ventilated areas - do not work with them in confined, unventilated areas.
- **Do not drink alcoholic beverages or take medications containing alcohol before or during working with solvents.** Alcohol in the bloodstream sometimes causes synergistic reactions with various solvents that can lead to loss of consciousness, and even possibly, death.
- **Report any ill effects and skin disorders to the area supervisor.**
- Develop and maintain good personal hygiene habits. Remove protective equipment and wash thoroughly after contact with solvents.
- **Fumes from paints, solvents, adhesives can drift into the shop.** Work with staff to minimize these problems.
- **Mix resins in small batches.**
- **Wear eye protection.**

Safety Guidelines for Heavy Sanding of Wood and Foam

- Sand in well ventilated areas away from other machines, only on the patio with the doors to the shop closed.
- **Use a vacuum to collect dust** while sanding to prevent the dispersal over a large area.
- A dust mask must be worn.
- **Safety glasses must be worn when sanding.**

Guidelines for Cleaning

- **Turn off power to the machine before cleaning.** This will avoid accidentally starting the machine and injuring yourself.
- **Remove cutting tools.** Take out drill bits, mills and remove lathe tools to reduce the chances of getting cut. On the table saw lower the blade completely.
- **Put away all hand tools** and other items
- **Clean chips from the tool,** the chip pans. Recycle clean chips where possible.
- **Spray a light coat of NOCOR** on the machine ways
- **Sweep the floor** in the area where you have been working.
- **Do not over use compressed air.** Do not blow air into the bearing surfaces, and do not scatter chips all over the shop. Sometimes a shop vacuum works better than the air gun.
- **Report missing, broken or damaged tools** to shop staff.
- **Spend five minutes on general cleaning around the shop. We're all in this together**

Appendix

SOP Standard Operating Procedures for equipment in the shop.



DO NOT use this machine unless you have received proper instruction and have been qualified in its safe use.



Safety glasses must be worn at all times in work areas.



Long and loose hair must be contained or constrained.



Appropriate footwear with substantial uppers must be worn.



Close fitting, protective clothing or a workshop apron is encouraged.



Rings and jewellery must not be worn.



Hearing protection may be required for some drilling operations.

PRE-OPERATIONAL SAFETY CHECKS

1. Ensure no slip/trip hazards are present in workspaces and walkways.
2. Locate and ensure you are familiar with the operation of the ON/OFF starter and E-Stop (if fitted).
3. Check that all guards are in position.
4. Ensure push stick is available.
5. Lower the blade guide and guard to full effect.
6. Start the dust extraction unit before using the saw.
7. Faulty equipment must not be used. Immediately report suspect machinery.

Keep fingers off the line of the cut at all times

OPERATIONAL SAFETY CHECKS

1. Never leave the machine running unattended.
2. The workpiece should be fed forward evenly and held firmly on the table to ensure effective control during cutting whilst keeping hands in a safe position.
3. Use a push stick when feeding material past the blade.
4. Do not force a wide blade on a cut of small radius. Use relief cuts when cutting sharp curves.
5. Before making adjustments switch off the saw and bring the machine to a complete standstill.
6. Stop the machine before attempting to back the work away from the blade.
7. Stop the saw immediately if the blade develops a 'click'. Inform technician.

HOUSEKEEPING

1. Switch off the saw and reset all guards to a fully closed position.
2. Leave the machine in a safe, clean and tidy state.

FORBIDDEN

- Attempting to cut very small items
- Cutting cylindrical or irregular parts



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Hearing protection may be required for some drilling operations.

PRE-OPERATIONAL SAFETY CHECKS

8. Ensure no slip/trip hazards are present in workspaces and walkways.
9. Check that all guards are in position.
10. Ensure hydraulic damping mechanism functions.
11. Check that the blade is in good condition.
12. Ensure that blade speed, blade tension and blade tracking are properly adjusted.
13. Check coolant delivery system to allow for sufficient flow of coolant.
14. Locate and ensure you are familiar with the operation of the ON/OFF starter and E-Stop (if fitted).
15. Faulty equipment must not be used. Immediately report suspect machinery.

OPERATIONAL SAFETY CHECKS

8. Lift the head of unit up and lock it in the upward position.
9. Set the angle of the vice, or check it to ensure its squareness.
10. Clamp work piece firmly into the vice. Long material must be supported.
11. Adjust blade guards to cover unused portion of blade.
12. Ensure hands are away from the blade, and then turn the machine on.
13. Allow the upper head assembly to come down slowly until the teeth are cutting the material.
14. Keep hands away from the point of operation during cutting.
15. Turn off the machine and bring it to a complete standstill if the blade is to be lifted out of an uncompleted or jammed cut.
16. Stop the machine and bring it to a complete standstill before removing scrap pieces from the vice area or making adjustments.
17. Stop the saw immediately if the blade develops a 'click'. Report it to your teacher.
18. Ensure the cutting head is locked in the upward position before removing work piece from vice.

HOUSEKEEPING

3. Switch off the saw and reset all guards to a fully closed position.
4. Leave the machine in a safe, clean and tidy state.

FORBIDDEN

- Pushing down on the cutting head while cutting
- Leaving the machine running unattended



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Safety glasses must be worn at all times in work areas.



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Appropriate footwear with substantial uppers must be worn.



Close fitting, protective clothing or a workshop apron is encouraged.



Rings and jewellery must not be worn.



Hearing protection may be required for some drilling operations.

PRE-OPERATIONAL SAFETY CHECKS

1. Check workspace and walkways to ensure no slip-hazards are present.
2. Check that the drill chuck guard is in position.
3. Ensure the chuck key (if used) has been removed from the drill chuck.
4. Locate and ensure you are familiar with the operation of the ON/OFF starter and E-Stop.
5. Follow correct clamping procedures to ensure work is secure.
6. If the job obstructs the walkway erect a barricade.
7. Adjust spindle speed to suit drill, cutter diameter and type of material.
8. Faulty equipment must not be used. Immediately report suspect equipment.

OPERATIONAL SAFETY CHECKS

1. Never leave the Drill Press while it is running.
2. Before making adjustments or before cleaning accumulated swarf, switch off and bring the machine to a complete standstill.
3. Feed downwards at a sufficient rate to keep the drill cutting.
4. Feed with care as the drill breaks through the underside of the work.
5. Use a safe working posture. Beware of clothing or hair catching in the drill chuck or bit.

HOUSEKEEPING

1. Switch off the machine.
2. Leave the machine in a safe, clean and tidy state.

POTENTIAL HAZARDS

- Entanglement in rotating spindle or drill
- Eye injuries
- Flying swarf or chips
- Sharp edges & burrs
- Hot surfaces or drill bits



DO NOT use this machine unless a teacher has instructed you in its safe use and operation and has given you permission.



Double eye protection must be worn when using grinder.



Long and loose hair must be contained.



Appropriate footwear with substantial uppers must be worn.



Close fitting/protective clothing must be worn.



Rings and jewellery must not be worn.



Hearing protection must be used when using this machine.

Only one person may operate this machine at any one time.

PRE-OPERATIONAL SAFETY CHECKS

1. Check workspaces and walkways to ensure no slip/trip hazards are present.
2. Ensure all guards and safety shields are in position before starting the grinder.
3. Ensure that the wheels do not touch the work rest and that the gap between wheel and rest is no greater than 1/8".
4. Check that wheels are running true and are not glazed or loaded.
5. Locate and ensure you are familiar with the operation of the ON/OFF starter.
6. Faulty equipment must not be used. Immediately report any suspect machinery.

OPERATIONAL SAFETY CHECKS

1. Stand to the side of the wheels when starting up.
2. Let the wheels gain maximum speed before starting to grind.
3. Do not grind on the side of the wheel.
4. Small objects must not be held by hand.
5. Never leave the machine running unattended.
6. Do not bend down near the machine whilst it is running.
7. Never force the workpiece against a wheel.
8. Slowly move the workpiece across the face of the wheel in a uniform manner.

HOUSEKEEPING

1. Switch off the machine.
2. Leave the machine in a safe, clean and tidy state.

POTENTIAL HAZARDS

- | | | | |
|--------------------------------|---------------------------------------|----------------|---------|
| ■ Hot Metal
edges and burrs | ■ Sparks | ■ Noise | ■ Sharp |
| ■ Entanglement | ■ Wheels 'run on' after switching off | ■ Eye injuries | |

FORBIDDEN

- Workpiece must never be held with gloves, cloth, apron or pliers
- Grinding non-ferrous metals



DO NOT use this machine unless you have received proper instruction and have been qualified in its safe use.



Safety glasses must be worn at all times in work areas.



Long and loose hair must be contained or constrained.



Appropriate footwear with substantial uppers must be worn.



Close fitting, protective clothing or a workshop apron is encouraged.



Rings and jewellery must not be worn.



Hearing protection may be required for some drilling operations.

Only one person may operate this machine at any one time.

PRE-OPERATIONAL SAFETY CHECKS

1. Check workspaces and walkways to ensure no slip/trip hazards are present.
2. Ensure you are familiar with the operation of the ON/OFF starter and E-Stop (if fitted).
3. Check the table is set not more than 2mm from disc.
4. Check belts and discs are in a serviceable condition.
5. Operator must be positioned out of direct line of abrasive belt at all times.
6. Ensure dust extraction is on before operating machine.
7. Faulty equipment must not be used. Immediately report suspect machinery.

OPERATIONAL SAFETY CHECKS

1. Allow machine to reach maximum revolutions before operating to avoid overloading.
2. Always place material on the table on the downward side of the disc travel to hold it down on the table surface.
3. Hold material firmly against stops or table before applying pressure on abrasive.
4. Keep fingers clear of disc or belt while sanding.
5. Never leave the machine while it is running.
6. Before making adjustments switch off and bring the machine to a complete standstill.

HOUSEKEEPING

3. Switch off the machine.
4. Leave the machine in a safe, clean and tidy state.

POTENTIAL HAZARDS

- Abrasions
- Burns to skin
- Eye injuries
- Excessive dust
- Unsecured material being flung around

FORBIDDEN

- Attempting to sand very small items
- Attempting to sharpen tools
- Attempting to sand anything not wood or aluminium or plastic