



# Construction

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# Kickback: Instructor Page



When an accident occurs with woodworking equipment, kickback is often cited as the primary cause. The problem with this term is that it has been used to cover so many different occurrences that it is in danger of becoming meaningless. In this manual, "kickback" will be used as defined below.

Kickback occurs when a rotating cutter causes the work piece that is being secured (radial arm, chop saw) or propelled (tablesaw, jointer) by the operator to be thrown violently, usually back towards the operator. This sudden action is often followed by the hands of the operator being drawn into the cutter. Hand power tools, such as portable circular saws and biscuit machines, are thrown out of the cut by kickback. The danger is obvious.

Kickback is a problem distinct from that arising from trapped offcuts. When an offcut (falling piece) which is not secured or propelled by, the operator is trapped between a fixed object and a rotating blade, the offcut can be thrown violently.

# Air Nailer

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- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields and proper clothing as appropriate. Do not wear loose clothing or jewelry when operating power tools. Long hair must be tied back. Wearing a glove on the trigger hand may cause unintentional activation of the nailer.
- Do not operate the air nailer without the instructor's permission.
- Before operating the equipment, notify the teacher you are ready to begin.
- Follow the manufacturer's instructions for lubricating and changing tool accessories.
- **Keep your finger off the trigger when carrying the tool and at any time you are not nailing.**
- Use proper nails for the job, set nailer to proper pressure for wood strength and thickness.
- Never nail towards yourself or others.
- Be aware of what is behind the piece you are going to nail. Watch for catches along the air line and clear the area before working.
- Make adjustments to the nailer only when air is disconnected.
- Fire the nailer only when you are applying even pressure and have a firm grip of the handle.
- Make sure you use only the proper connectors on the hoses.
- Never step on hoses. This prevents wear and reduces tripping hazards.
- Never operate a nailer at pressure higher than it was designed for.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

# Machine Review Sheet

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## Air Nailer

### Purpose:

1. A type of air powered tool used to drive nails into wood or other kinds of material.
2. Nail guns have in many ways replaced hammers as tools of choice. They were originally designed to speed the construction of housing floor sheathing and sub-floors.

**Key Words:** pneumatic, fasteners (nails, staples), air pressure, trigger,

**Safety:** *The following are in addition to General Safety Rules.*

1. Always use a CSA approved safety glasses, goggles or a face shield.
2. Inspect the tool before connecting to the air supply.
3. Adjust the air supply pressure to match the type of fasteners used with the material being nailed.
4. Never aim nailer at yourself or others.
5. Make adjustments to the nailer only when air supply is disconnected.
6. Always disconnect the air supply hose when work is finished and depress the trigger to exhaust the remaining air from the tool.

### Techniques:

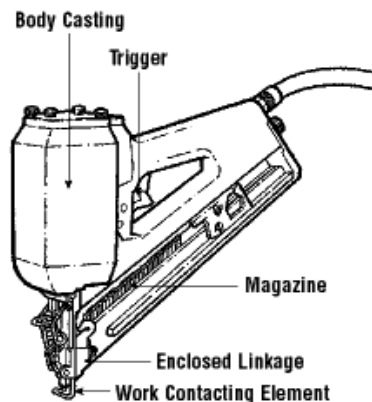
1. Do not depress the trigger unless the nose piece of tool is directed onto a safe work surface.
2. Always handle a nailer as if it is loaded with fasteners.
3. Disconnect nailer from air supply when not in use and during cleaning.
4. Before clearing a blockage, be sure to depress the trigger to exhaust all air from the nailer.

# Student Handout



## What general safety principles should you follow when using pneumatic nailing and stapling tools?

- Permit only experienced and trained people to operate pneumatic nailing and stapling tools.
- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles) and, where necessary, use hearing protection.
- Inspect each tool before connecting it to the air supply:
  - Check tool safety mechanisms if applicable.
  - Tighten all screws and cylinder caps securely.
- Check for correct air supply and pressure before connecting a tool.
- Check that the tool is correctly and securely connected to the air supply hose, in good working order, and has a fully operating safety mechanism before using.
- Always handle a tool as if it is loaded with fasteners (nails, staples, etc.).
- Equip tools with a work-contacting element that limits the contact area to one that is as small as practical.
- Make sure that the mechanical linkage between work-contacting element and trigger is enclosed.



- Disconnect tool from air supply when not in use and during cleaning or adjustment. Before clearing a blockage, be sure to depress the trigger to exhaust all air from the tool.
- Use only fasteners recommended by the manufacturer.
- Permit only properly trained people to carry out tool maintenance.

Continued ...





## What should you avoid when using pneumatic nailing and stapling tools?

- Do not point the tool toward yourself or anyone else whether it contains fasteners or not.
- Do not operate at a pressure above the manufacturers' rating.
- Do not depress the trigger unless the nose piece of tool is directed onto a safe work surface.
- Do not carry a tool with the trigger depressed.
- Do not load a tool with fasteners while the trigger is depressed.
- Do not overreach. Keep proper footing and balance.



- Do not use compressed air to blow debris or to clean dirt from clothes.

# Observational Checklist



## Air Nailer

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety goggles, face shield or glasses worn.		
3. Hearing protection worn.		
4. Always handles the tool as if it is loaded with fasteners.		
5. Checked tool safety mechanisms.		
6. Does not carry the tool with the trigger depressed.		
7. Does not point the tool toward him/herself or anyone else whether it contains fasteners or not.		
8. Does not operate at air pressure above the manufacturers' rating.		
9. Keeps the work area around him/herself clear.		
10. Does not depress the trigger unless the nose piece of the tool is directed onto a safe work surface.		
11. Does not overreach. Keeps proper footing and balance.		

# Safety Quiz



## Air Nailer

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Always wear \_\_\_\_\_ goggles or a face shield.
2. Use \_\_\_\_\_ nails for the job.
3. Set the compressor to the proper \_\_\_\_\_.
4. Never nail \_\_\_\_\_ yourself or anyone else.
5. Be aware of what \_\_\_\_\_ the piece you are nailing.
6. \_\_\_\_\_ the nailer when it is disconnected.
7. Watch for \_\_\_\_\_ along the air line.
8. Remove all \_\_\_\_\_ and restrain long \_\_\_\_\_.
9. Use the proper \_\_\_\_\_ on the hoses.
10. Fire the nailer only when you are applying even \_\_\_\_\_ and have a firm \_\_\_\_\_ on the handle.

### WORD BANK:

pressure, grip, load, hang ups, behind, safety, proper, pressure, towards, jewellery, hair, connectors

# Student Safety Passport



## Air Nailer

### General Conditions

Students must be trained on the safe and proper use of an **Air Nailer** before they may begin using it. The student must demonstrate safe and proficient use prior to using the Air Nailer.

### Personal Protective Equipment

- Safety Glasses
- Safety footwear
- Safety Harness (when on a roof)
- Safety Cable (for nailer)
- Gloves

### Possible Risk Factor

- Slips and falls [working on roofs]
- Impalement
- Trigger Finger: repeated finger flexion, prolonged gripping
- Eye injuries
- Injury to others
- Back injuries [fatigue]

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of an **Air Nailer**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Air Nailer

**OBTAIN “STUDENT TECH PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**SET AIR PRESSURE ACCORDING TO NAILER  
MANUFACTURER**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**KEEP YOUR FINGER OFF THE TRIGGER WHEN  
CARRYING THE TOOL AND AT ANY TIME YOU  
ARE NOT NAILING**

# Band Saw

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- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate.
- No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate the band saw without the instructor's permission.
- Follow the manufacturer's instructions for changing tool accessories.
- Be aware of the position of the **ON/OFF** switches and emergency **STOP** button.
- Make all adjustments with the power **OFF**.
- Use both hands and keep fingers at least 10cm (4") from the blade at all times; adjust guard prior to turning the saw on.
- Keep upper guide less than 5mm (1/4") from the material being cut.
- Plan your cuts carefully. Saw curves gradually. Sudden twists may cause the blade to bind or break. Use relief cuts if necessary.
- If the blade breaks, turn the power off immediately and step back. Inform the instructor immediately.
- Always make short cuts first. Avoid backing out of cuts with the power on. Backing out of a cut may cause the blade to come off of the drive wheel.
- Do not cut cylindrical stock without the use of a V block clamp.
- Remove scrap pieces from the table only after the blade has stopped.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

**Continued ...**

# Band Saw



- Always operate the saw from the front never from the side.
- Do not leave the band saw until the blade has stopped.
- Ensure that the blade is running at full speed before starting a cut.
- Cut on the waste side of your line, leaving the pattern line on the work.
- Keep your hands beside or behind the blade. Never in front. Use a push stick on small pieces.
- Make sure all guards are in place and properly adjusted. Ensure all band wheels are enclosed.
- Ensure the blade is tracking correctly and runs freely in the upper and lower guide rollers. Ensure the blade is under proper tension. See your instructor for guidance.
- Use band saw blades that are sharp, properly set and otherwise suitable for the job (e.g., the right tooth pitch; tooth form; blade width).
- Hold stock firmly and flat on the table to prevent the stock from turning and drawing your fingers against the blade.
- Use a push stick when you remove cut pieces from between the fence and saw blade or when your hands are close to the blade. Keep your hands on either side of the blade - not in line with the cutting line and the blade.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



## Band Saw

### *Purpose:*

1. To cut curves and irregular shapes, as well as straight cuts.
2. To re-saw thick material into thinner pieces.

**Key Words:** rip, crosscut, re-saw, relief cuts, kerf

**Safety:** *The following are in addition to the General Safety Rules.*

1. Secure instructor's approval.
2. Wear safety glasses.
3. Adjust the blade guard to be 1/8" above the material being cut before turning on the machine.
4. Maintain a 4" margin of safety between the blade and your hands.
5. Stock should be held securely against the table.
6. Round or irregularly shaped stock must be secured to prevent rotation as it is being cut.
7. Do not force material through the blade too quickly.
8. Only back out of straight cuts.
9. Relief cuts help material that interferes with the cut fall away.
10. Smaller pieces may be taped to larger ones to be cut.
11. If the blade breaks, shut off the machine and inform the instructor. Do not break open the doors.
12. When finished, turn off the machine, lower the blade guide to the table, clean up debris.

### **Techniques:**

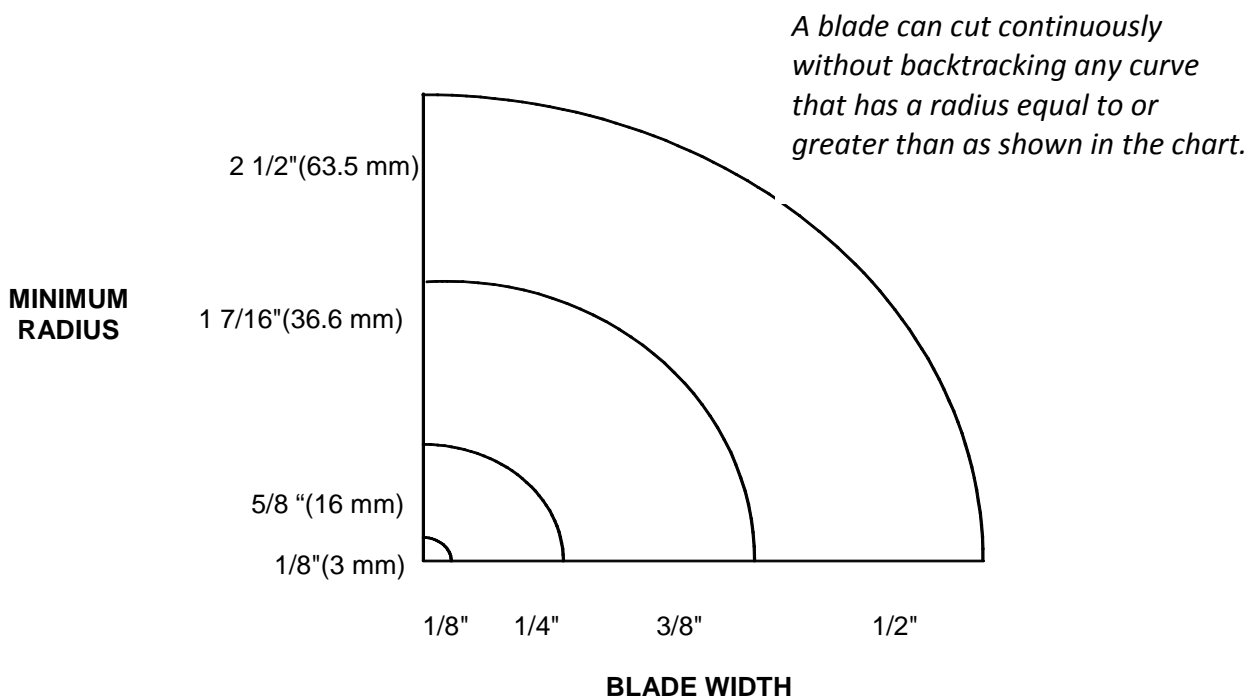
1. Always advance the work piece into the blade as it is being rotated.
2. Always cut on the waste side of your layout line. Later, sand up to the line.
3. The sides of the kerf limit how much a board can be turned before the blade binds. The narrower the blade, the tighter the possible curve. **Continued ...**





## Do not use without permission of instructor

- Eye protection must be worn while operating this machine.
- Remove loose clothing, jewelry and tie back long hair.
- Do not operate the band saw unless all guards are in place.
- Before cutting arcs (curves) ensure that the blade width is appropriate
  - (see chart below).
- Adjust the upper blade guide 1/8" (3 mm) above the material being cut.
- Maintain a 2" (50 mm) margin of safety (hands 2" away from the blade).
- Do not back stock out of curved or jammed cut while the machine is running.
- The stock must be held flat on the table. Round stock must not be cut unless mounted securely in a jig or hand screw.
- Small pieces may be taped or clamped to larger ones in order to be cut.
- Do not cut radii so small that the blade is twisted. Make "release" cuts before cutting tight curves.
- If you hear a clicking noise, turn off the machine. The noise may indicate a cracked blade.
- If a blade breaks, shut off the machine and inform the instructor.
- When finished, shut off the power and wait until the blade has stopped. Lower the blade guide/guard down to the table.
- Do not remove dust or particles of wood from a table by hand or compressed air, use a brush.





## What should you do before using a band saw?

A band saw can be dangerous if not used properly.

- Read the owner's manual carefully.
- Make sure you understand the instructions before attempting to use any tool or machine.
- Learn the applications and limitations before use.
- Securely anchor the band saw to the floor (or a workbench of appropriate height) to reduce vibration.

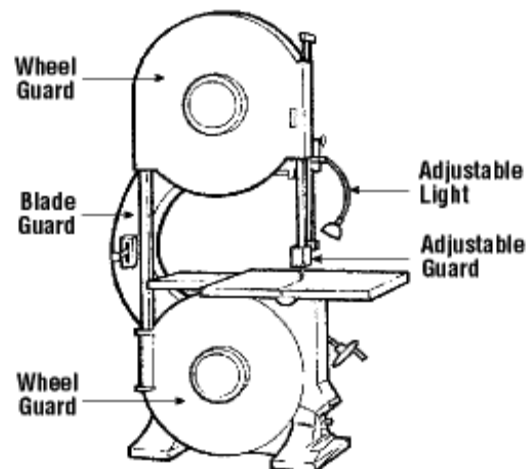
## What safety procedures should you follow when using a band saw?

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles).
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area.
- Wear protective footwear when required.
- Make sure all guards are in place and properly adjusted. Ensure all band wheels are enclosed.
- Adjust blade guard height to about 3 mm or 1/8 inch above the top of the material being cut.
- Ensure the blade is tracking correctly and runs freely in and against the upper and lower guide rollers.
- Ensure the blade is under proper tension. A band saw equipped with automatic tension control is desirable.
- Use band saw blades that are sharp, properly set and otherwise suitable for the job (e.g., the right tooth pitch; tooth form; blade width).
- Hold stock firmly and flat on the table to prevent the stock from turning and drawing your fingers against the blade. Keep hands braced against the table.
- Use a push stick when you remove cut pieces from between the fence and saw blade or when your hands are close to the blade. Keep your hands on either side of the blade – not in line with the cutting line and the blade.

**Continued ...**



- Make release (relief) cuts before tight curves when doing intricate scroll-type work.
- Keep the floor around a band saw clean and free of obstructions or clutter.
- Keep the machine properly oiled and serviced.
- Provide adequate lighting at the machine table. A light fixture with a flexible connection can provide essential lighting.



## What should you avoid when working with a band saw?

- Do not use excessive force when pushing the wood past the blade.
- Do not back the stock away from the blade while the saw is in motion if the work piece binds or pinches on the blade.
- Do not stop a band saw by thrusting stock against the cutting edge or the side of a blade immediately after the power has been shut off.
- Do not remove sawdust or cuttings from the table by hand or with compressed air. Use a stick or brush.
- Do not leave a saw running unattended. Turn off the power and make sure the machine has stopped running before leaving the area.

# Observational Checklist



## Band Saw Operation

*Mastery is required.*

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety glasses worn.		
3. Machine tables are clear of tools, stock, and debris. The area around the machine is clear.		
4. Guide post is adjusted 1/8" above work before machine is started.		
5. When making curved cuts, the work is rotated while being advanced into the blade. The radius of the curve is appropriate for the blade. Relief cuts are used for tighter curves. The blade is not "backed out" of curved cuts.		
6. A 2" margin of safety is maintained.		
7. Feed speed is appropriate.		
8. When finished, the machine is shut off, the guide post lowered, and the table and surrounding area are cleared of offcuts.		

# Safety Quiz



## Band Saw

Name \_\_\_\_\_ Date: \_\_\_\_\_

1. When using the band saw, \_\_\_\_\_ are required when making curved cuts.
2. You should adjust the \_\_\_\_\_ above the work before beginning to cut.
3. Narrow blades are best suited for cutting \_\_\_\_\_.
4. When cutting with the band saw, the blade should cut on the \_\_\_\_\_ side of the work piece.
5. When using the band saw, plan your cuts carefully. Saw curves gradually.  
Sudden twists will cause the blade to \_\_\_\_\_ or \_\_\_\_\_.
6. When using the band saw, keep your hands \_\_\_\_\_ or \_\_\_\_\_ the blade.  
Never in front.
7. Inspect all \_\_\_\_\_ before using any saw.
8. Always support \_\_\_\_\_ pieces.
9. Use \_\_\_\_\_ sticks on small pieces.
10. Use the \_\_\_\_\_ when changing blades.

### WORD BANK:

relief cuts, upper guide, tight, waste, bind, break, beside, behind, guards, round, push, lock-out

# Student Safety Passport



## Band Saw

### General Conditions

Students must be trained on the safe and proper use of the **Band Saw** before they may begin using it. The student must demonstrate safe and proficient procedures.

### Personal Protective Equipment

- Safety Glasses
- Coveralls
- Safety footwear
- Gloves [material handling]

### Possible Risk Factor

- Entanglement [hands and hair]
- Cutting fluid fumes
- Small projectiles [chips]
- Hand injuries
- Cuts and Abrasions
- Eye injuries

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of a **Band Saw**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Band Saw

**OBTAIN "STUDENT TECH PASS"**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**KEEP FINGERS AT LEAST 5CM (2") FROM THE BLADE**

**UPPER GUIDE LESS THAN 5MM (1/4") FROM THE MATERIAL**

**KEEP YOUR HANDS BESIDE OR BEHIND THE BLADE, NEVER  
IN FRONT. USE A PUSH STICK ON SMALL PIECES.**

**ALL GUARDS ARE IN PLACE AND PROPERLY ADJUSTED**

**HOLD STOCK FIRMLY AND FLAT ON THE TABLE**

**USE A PUSH STICK WHEN YOU REMOVE CUT PIECES FROM  
BETWEEN THE FENCE AND SAW BLADE**

# Belt and Disc Sanders

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- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate.
- No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate the belt and disc sander without the instructor's permission.
- Be aware of the position of the **ON/OFF** switches and emergency **STOP** button.
- Remove all sawdust around the belt/disc sander.
- Do not operate if the abrasive paper is loose or torn.
- Ensure that power is off when changing the belt.
- Sand only on the rotating-*down side surface* of the disc sander.
- Sand only dry wood.
- The stock must be positioned against the table at all times.
- Belt sander roll end and side guards should be properly adjusted and in good condition.
- Do not apply excessive force toward the belt or disc. Let the machine do the work.
- Dust collector operating and properly connected to remove dust.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



# Machine Review Sheet



## Belt and Disc Sanders

### Purpose:

1. Belt and disc sanders are used in shaping and finishing wood and other materials.
2. Fitted with fine grit sand paper, a belt sander can be used to achieve a completely smooth surface.

**Key Words:** abrasive surface, belt, disc, pulley drums

**Safety:** *The following are in addition to General Safety Rules.*

1. Make sure both the disc and the belt are correctly installed or mounted.
2. Make sure guards are secure and adjustments are made before operating.
3. Use table, fence and guides to control the movement and position of the work.
4. Look for frayed or torn belt. Replace if necessary.
5. Small pieces should be held in a hand clamp or jig.
6. Use for sanding or shaping only, not for removing large amounts of material, cutting irregular shapes or cutting stock.
7. Keep stock in motion to prevent burning due to friction.
8. Keep hands at least 2 inches away from the belt or disc.

### Techniques:

1. Sand on the down side and from the center to outside on the disc sander. Check the rotation of the disc.
2. Feed the stock directly against the sanding belt. Never feed from the left or right as it could damage the belt.
3. Not moving the stock around will cause the belt to wear prematurely and can ruin it. Move from side to side and use the whole belt.
4. Do not sand the sides of thin materials without use of proper jig.
5. Have qualified instructor double check/or help with any concerns before starting up the belt/disc sander.



## Belt and Disc Sanders

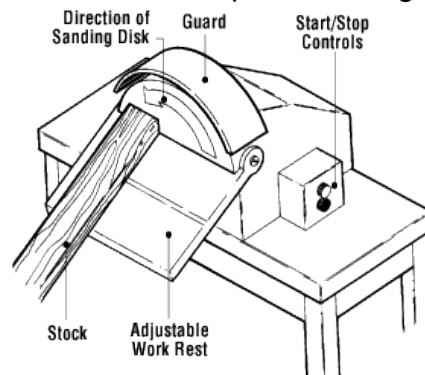
### What should you do before using sanders?

Sanders can be dangerous if not used properly.

- Read the owner's manual carefully.
- Make sure you understand instructions before attempting to use any tool or machine.
- Learn the applications and limitations before use.

### What safety procedures should you follow when using sanders?

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles) when operating a sander.
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area.
- Wear protective footwear when required.
- Use sanders with the local exhaust ventilation (LEV) turned on. The LEV should be designed for the sander and well maintained to work effectively.
- Wear respiratory protection (e.g., dust masks) where required, during sanding operations and clean up.
- Keep hands away from the abrasive surface.
- Hold small or thin pieces of stock in a jig or holding device to prevent injuries to the fingers or hands.
- Inspect abrasive belts before using them. Replace belts worn, frayed, or excessively worn in spots.
- Sand on the downward side of a disc sander so that the wood is driven onto the table by the machine's rotation.
- Enclose all drums, disk or belt sanding machines with an exhaust dust hood that covers all portions of the machine but the portion designed for the work feed.

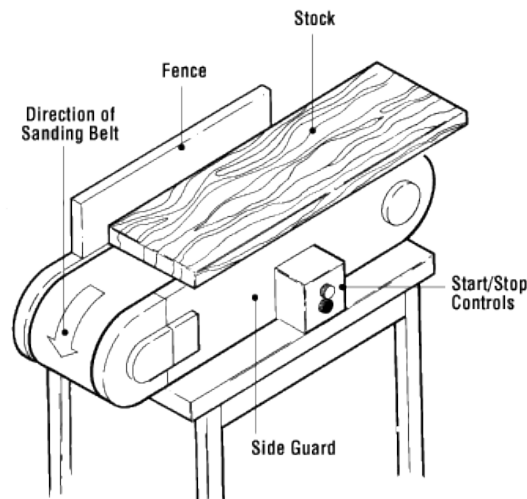


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## Belt and Disc Sanders

- Adjust work rests on all manually fed sanders to provide minimum clearance between the belt and the rest. The work rest should be secured properly.
- Install abrasive belts that are the same width as the pulley drum.
- Adjust abrasive belt tension to keep the belt running the same speed as pulley-drum when the wood is in contact with the belt.
- Guard feed rollers to allow boards to pass, but keep operators' fingers and arms out.
- Install guards to prevent contacts at:
  - in-running nip points,
  - power transmission,
  - feed roll parts, and
  - the unused portion of the abrasion belt on the operator's side of the machine.



### What should you avoid when using sanders?

- Do not sand small or thin hand-held work pieces.
- Do not wear loose clothing or jewelry while using revolving power tools. Tie back long hair or wear appropriate hair protection. These measures will prevent hair, clothing, or jewelry (like dangling neck chains) from being caught and pulled by sander belts and pulleys that are in motion.
- Do not operate sanders without the exhaust system operating.
- Do not operate sanders unless adequately guarded.
- Do not operate sanders unless the work rest is properly adjusted.

**Continued ...**



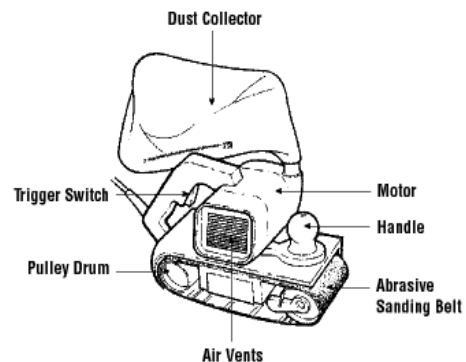
## Belt and Disc Sanders

### What should you do to work safely with belt sanders?

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles).
- Wear a dust respirator for dusty operations.
- Make sure the sander is switched "OFF" before connecting the power supply.
- Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.
- Inspect sanding belts before using them. Replace those belts worn or frayed.
- Install sanding belts that are the same widths as the pulley drum.
- Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.
- Secure the sanding belt in the direction shown on the belt and the machine.
- Keep hands away from a sanding belt.
- Use two hands to operate sanders - one on a trigger switch and the other on a front handle knob.
- Keep all cords clear of sanding area during use.
- Clean dust from the motor and vents at regular intervals.

### What should you avoid while working with belt sanders?

- Do not use a sander without an exhaust system or a dust collector present that is in good working order. Empty the collector when 1/4 full. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential.
- Do not exert excessive pressure on a moving sander. The weight of the sander supplies adequate pressure for the job.
- Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stock into place or use a "stop block" to prevent movement.
- Do not overreach. Always keep proper footing and balance.



- Do not cover the air vents of the sander.

# Observational Checklist



## Belt and Disc Sander

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety glasses worn. Wear a dust respirator.		
3. Machine tables are clear of tools, stock, and debris. The area around the machine is clear.		
4. Table, fence and guides are in place before machine is started. Looked for frayed or torn belt.		
5. Used for sanding or shaping only, not for removing large amounts of material, cutting irregular shapes or cutting stock.		
6. A 2" margin of safety is maintained.		
7. Feed speed is appropriate.		
8. When finished, the machine is shut off and the table and surrounding area are cleared of dust and other debris.		

# Safety Quiz

---



## Belt and Disc Sanders

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Wear \_\_\_\_\_ goggles or a face shield.
2. Secure the \_\_\_\_\_ position before beginning sanding procedures.
3. Check the \_\_\_\_\_ of the disk. Work on the downward side of the motion.
4. Wear a \_\_\_\_\_ mask when sanding treated wood. Put the vacuum on.
5. Only one person \_\_\_\_\_ the machine at a time.
6. Remove \_\_\_\_\_ and tie back \_\_\_\_\_ hair.
7. Let the work \_\_\_\_\_ on the table and do not force it into the disc or the belt.
8. Keep your \_\_\_\_\_ away from the edge that contacts the sandpaper.

**WORD BANK:** safety, jewelry, long, dust, table, rest, fingers, rotation, operates

# Student Safety Passport



## Belt and Disk Sanders

### General Conditions

Students must be trained on the safe and proper use of a **Belt/ Disc Sander** before they may begin using it. The student must demonstrate the ability to use the equipment safely and proficiently.

### Personal Protective Equipment

- Safety Glasses
- Safety footwear
- Dust mask [breathing protection]

### Possible Risk Factor

- Small projectiles [wood pieces]
- Slips and falls [wood dust]
- Fine dust Hazard
- Entanglement of hair, clothing and jewelry
- Burns and abrasions to hands and fingers
- Crushing of fingers

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of **Belt and Disk Sanders**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Belt and Disc Sanders

**OBTAIN “STUDENT SAFETY PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**WEAR A DUST RESPIRATOR**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**2" MARGIN OF SAFETY**



# Bench Grinder

---



- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate. No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate any grinder without the instructor's permission.
- Ensure all safety guards are in place.
- Be aware of the position of the **ON/OFF** switches and emergency **STOP** button.
- Bench Grinder must be securely fastened to bench.
- Always check the clearance of the tool rest before starting work. Clearance should never be more than 3mm (1/8 inch). Always set the tool rest clearance when the wheel is not turning.
- When mounting or replacing any grinding wheel, always ensure that it fits properly on the spindle. Never use a grinding wheel that is loose on the shaft.
- In securing the wheel to the spindle be sure that the blotters are affixed to both sides of the wheel and that washers and nuts are of the correct size.
- When starting up any grinding wheel, stand to one side out of line with the wheel especially if it is a new one.
- Only replace a grinding wheel with one that has the same speed rating. Excessive speed on lower speed rated grinding wheels can cause the wheel to shatter.
- Only grind on the face of the wheel, Use the entire face to avoid grooving the wheel.
- Always feed the work into the wheel gradually. Too much pressure or striking the wheel suddenly may cause it to fracture.
- Shut off machine immediately if it begins to chatter or vibrate. Never use tools or hands to stop any grinder. Report chattering and vibration to the teacher.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

# Machine Review Sheet

---



## Bench Grinder

### Purpose:

1. To grind metal prior to welding to prep the surface, or after welding to clean up a weld.
2. To cut steel when equipped with a metal cutting stone.
3. To shape steel.
4. To sharpen tools and bits.
5. To clean metal when equipped with a wire wheel.

**Key Words:** pneumatic, electric, grinder stones, grinder wheels, tools rest, dressing the stone

**Safety:** *The following are in addition to General Safety Rules.*

1. Always use a CSA approved face shield or safety glasses when grinding.
2. On a bench grinder, check the clearance to the tool rest before starting your work. Clearance of 1/8" or 3mm. is acceptable.
3. Check grinder disks for any flaws.
4. Stop the grinder immediately if it begins to chatter or vibrate
5. Stand to one side of the stone on the bench grinder and hold small objects with "Vise Grip" pliers.
6. Make every effort to ensure that sparks from the grinder are not hitting other workers in the area.
7. Always allow the grinder to reach full speed before using it.

### Techniques:

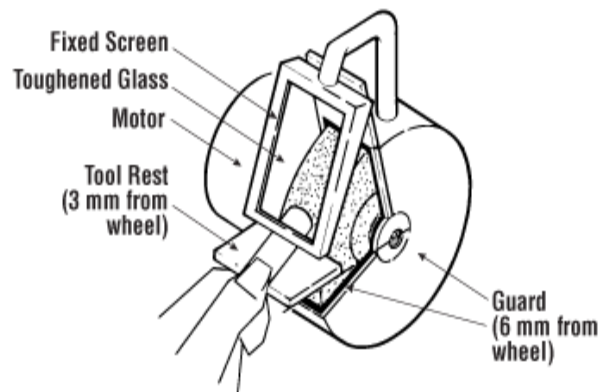
1. Always check that the stones on the grinders are rated for the RPM of the grinder in use.
2. When using a bench grinder only use the face of the stone, and not the side.
3. Check the cords on the grinder prior to plugging them into an outlet.



## Bench Grinder

What safety procedures should you follow when using bench grinders?

- Fasten bench grinders securely.
- Ensure all the guards are in place and secure before using a grinder.
- Adjust tool rests to within 3 mm (1/8 in.) of wheels. Never adjust rests while wheels are moving. Work rest height should be on horizontal centre line of the machine spindle.
- Maintain 6 mm (1/4 in.) wheel exposure with a tongue guard or a movable guard.
- Check that wheels have blotters on each side.
- Check the wheel fits properly to the spindle when mounting. If it is loose, get another wheel.

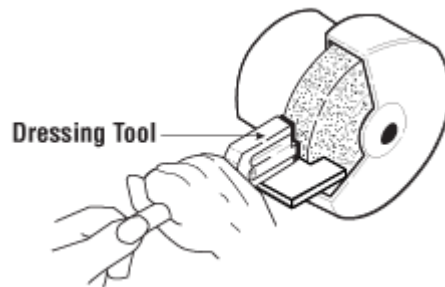


- Stand to one side of the grinder until the wheel reaches operating speed.
- Bring work into contact with the grinding wheel slowly and smoothly, without bumping.
- Apply gradual pressure to allow the wheel to warm up evenly. Use only the pressure required to complete a job.
- Move the work back and forth across the face of the wheel. This movement prevents grooves from forming.
- Wheels are made only for grinding certain items. Do not grind rough forgings on a small precision grinding wheel.

***Continued ...***



## Bench Grinder



- Dress wheels regularly. Do frequent, light dressings rather than one heavy dressings.
- Support dressing tools so you can apply leverage without undue effort. With revolving cutter dressing tools use the lugs as anchors.
- Replace worn wheels if you cannot dress it.
- Ensure the grinder speed does not exceed the operating speed marked on the wheel.
- Visually inspect wheels for possible damage before mounting.
- Wear proper personal protective equipment:
  - eye, ear and face protection,
  - metatarsal safety boots, where required,
  - respiratory protection may be required, depending on the work.
- Wear gloves only where necessary.

### What should you avoid when using bench grinders?

- Do not use a wheel that has been dropped.
- Do not use a wheel that does not fit properly to the spindle.
- Do not use excessive force to tighten the nut of the wheel. The force can crack the wheel.
- Do not grind wood, plastics and non-iron metals on ordinary wheels.
- Do not leave grinding wheels standing in liquids. The liquid can cause balance problems.
- Do not grind on the side of a regular wheel.

# Observational Checklist



## Bench Grinder Operation

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Personal Protective Equipment worn.		
3. Area is free of flammable hazards that could be ignited by flying sparks.		
4. Work is firmly secured into place or properly supported on the tool rest.		
5. Allows grinding wheel to reach full speed before gradually feeding in work.		
6. Has a secure footing and proper stance for grinder operation.		
7. Material is held with two hands or vice-grips for small pieces of material.		
8. Aims sparks away from other people.		
9. When finished grinding, raises or removes the material away from the grinding wheel and allows the wheel to stop on its own.		
10. Newly ground material will be sharp and hot. Allows material to cool down before handling. Gloves, vice-grips or tongs are used when necessary to handle material.		

# Safety Quiz



## Bench Grinder

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Always use a \_\_\_\_\_ or goggles when grinding.
2. Inspect the \_\_\_\_\_ of the wheel before starting the machine.
3. Check the \_\_\_\_\_ of the tool rest. It should not exceed \_\_\_\_\_ of an inch.
4. When starting up the grinder always \_\_\_\_\_ to one side, not directly in front of the wheel.
5. Check the \_\_\_\_\_ of the wheel. Excessive revolutions could cause the wheel to shatter.
6. Only use the \_\_\_\_\_ of the wheel.
7. Feed the work into the wheel \_\_\_\_\_.
8. Shut off the machine immediately if the wheel begins to \_\_\_\_\_ or vibrate.
9. Never use the \_\_\_\_\_ or hands to stop any grinder.

WORD BANK: Stand, clearance, one-eighth, material, speed, face shield, condition, face, gradually, chatter

# Student Safety Passport



## ***Bench Grinder***

### **General Conditions**

Students must be trained on the safe use of a **Bench Grinder** before they may begin using it. The student must demonstrate to the teacher proficiency and the safe work procedures that must be followed before usage.

### **Personal Protective Equipment**

- Face shield
- Safety glasses
- Leather welding gloves
- Coveralls or leather jacket/apron
- Safety footwear

### **Possible Risk Factors**

- Hot metal
- Eye injury
- Small projectiles
- Hand injuries
- Cuts and Abrasions
- Entanglement

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of a **Bench Grinder**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

---



## Bench Grinder

**OBTAIN “STUDENT TECH PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**ENSURE TOOL REST IS WITHIN  
3MM OF THE WHEEL**

**ONLY GRIND STEEL**

**NEVER STAND IN LINE WITH GRINDING WHEEL**

**ALLOW GRINDER TO REACH FULL SPEED  
BEFORE GRINDING**

**DO NOT GRIND USING THE SIDE OF THE WHEEL**



# Compressed Air & Pneumatic Tools



- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, faceshields, gloves and proper clothing as appropriate.
- Do not operate machines and equipment without the instructor's permission.
- Know the purpose of each tool you use, and use each for the specific task it was designed to do.
- Never use any tool - hand or power tool unless you are trained to do so and are familiar with its use.
- Always use the carrying handle to transport the compressor
- Always leave sufficient space (at least 5 meters) between the compressor and the work area in particular when using tools for spraying of liquids
- The compressor must be placed on a stable surface
- Never clean the machine with liquids or solvents when cleaning. Disconnect the machine from the electricity supply by removing the plug and use a damp cloth only.
- The compressor is designed for air compression only and must never be used for any other type of gas.
- Never direct the jet of air towards persons or animals or your body.
- When using compressed air, you must know and comply with the safety precautions to be adopted for the single applications (inflating, pneumatic tools, painting, washing with water based detergents only, etc.)

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

# Machinery Review Sheet

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## Compressed Air and Pneumatic Tools

### Purpose:

1. To assist in the repair and service of vehicles.
2. To assist in the removal of extremely light fasteners.
3. To increase the speed in which a job can be completed.
4. To clean parts.

**Key Words:** impact gun, air ratchet, blow gun, impact socket, air tool oil

**Safety:** *The following are in addition to the General Safety Rules.*

1. Always use a GSA-approved face shield or safety glasses when working with a blow gun or air tool.
2. Never use compressed air to clean your clothing of dust or particles.
3. Always use an impact type socket when using a pneumatic tool.
4. Never place a blow gun tight against your skin.

### Techniques:

1. Air tools are useful but can also cause a lot of damage if used incorrectly.
2. Students often underestimate the amount of torque an air tool can provide and this leads to stripped or broken fasteners.
3. Blow guns are often used to 'spin' dry bearings. This is not an acceptable practice as the bearing can fracture and blow apart.
4. Air compressors should be drained of water daily to prolong the life of the air tools. Each tool should also be oiled prior to its first use of the day.  
Air hammers (if used) should never be turned on unless the tool bit is tight against the work piece. If not, the tool head can fly out of the hammer with great force.
5. Universal joints, or sockets, should not be used with air tools unless they are of the impact variety.

# Student Handout



## Compressed Air and Pneumatic Tools

Compressed air is used for many jobs in the Transportation shop on a daily basis. It can be used for powering air tools, using a blow gun to clean off a part, or air testing a hydraulic item.

The amount of power that an air tool can deliver can be deceiving. Until you become familiar with the operation of an air wrench or other air tool, be careful not to over tighten bolts and nuts. It is easy to strip or break a fastener with an air tool.

When using a blow gun, wear eye protection. Direct the blast of air away from yourself and others. Do not blow brake and clutch parts clean. These parts contain small dust particles that can cause cancer.

No matter what the job, it is important to remember that if improperly used compressed air can be extremely dangerous. It can cause many serious injuries to the eyes, hands, and face. Realizing this, the student must always observe the following safety rules when using "Compressed Air and Air Tools"

### Safety Rules:

- **DANGER** shop air pressure is usually around 100 to 150 psi. This is enough to severely injure or kill. Respect shop air pressure.
- Wear CSA approved eye protection whenever using compressed air or air tools.
- Never turn on an air hammer unless the tool bit is pressed tightly against the work piece.  
If it is not tightly pressed, the tool head can fly out of the hammer with great force - as if shot from a gun.
- When using a blow gun never place it tight against your skin, and always direct the air blast away from you and other students.
- Only use a high speed type of rotary brush in an air drill. A brush designed for an electric drill may just fly apart. Be safe, adjust the air drill to the slowest speed available.

# Observational Checklist



## Compressed Air and Pneumatic Tools

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety goggles, face shield or glasses worn.		
3. Always handles the tool as if it is loaded.		
4. Checked tool safety mechanisms.		
5. Does not carry the tool with the trigger depressed.		
6. Never direct the jet of air towards persons		
7. Does not operate at air pressure above the manufacturers' rating.		
8. Keeps the work area around him/herself clear.		
9. Always leave sufficient space (at least 5 meters) between the compressor and the work area		

# Safety Quiz

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## Compressed Air and Pneumatic Tools

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Always wear \_\_\_\_\_ goggles or a face shield.
2. The compressor must be placed on a \_\_\_\_\_ surface
3. Set the compressor to the proper \_\_\_\_\_.
4. You should \_\_\_\_\_ direct the air jet at yourself or anyone else.
5. Always leave at least \_\_\_\_\_ between the compressor and the work area.
6. When using a blow gun never place it tight against your \_\_\_\_\_.
7. Do not \_\_\_\_\_ brake and clutch parts clean.
8. Remove all \_\_\_\_\_ and restrain long \_\_\_\_\_.
9. Use the proper \_\_\_\_\_ on the hoses.
10. Disconnect the machine from the electricity supply before \_\_\_\_\_.

### WORD BANK:

Safety, pressure, jewellery, hair, connectors, stable, never, 5 meters, skin, blow, cleaning.

# Student Safety Passport



## Compressed Air and Pneumatic Tools

### General Conditions

Students must be trained on the safe and proper use of an **Air Compressor** before they may begin using it. The student must demonstrate safe and proficient use prior to using the Air Compressor.

### Personal Protective Equipment

Safety Glasses  
Safety footwear  
Gloves

### Possible Risk Factor

Slips and falls [working on roofs]  
Impalement  
Trigger Finger: repeated finger flexion, prolonged gripping  
Eye injuries  
Injury to others  
Back injuries [fatigue]

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of an **Air Compressor**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Compressed Air & Pneumatic Tools

**OBTAIN “STUDENT TECH PASS”**

**USE PERSONAL PROTECTIVE EQUIPMENT**

**USE THE RIGHT TOOL FOR THE JOB**

**MAKE SURE THE TOOL IS IN GOOD REPAIR**

**NEVER ATTACH A NON-IMPACT TOOL TO AN  
SOURCE**

**NEVER BLOW AIR AT ANYONE OR AT  
YOURSELF**

# Drill Press

---



- Make sure that your **FACE SHIELD OR SAFETY GLASSES** are in place before you start the drill press.
- Always tie back long hair and keep your head and clothes well away from all moving parts of the drill press.
- Select only drills that are sharp, in good condition and suitable for the job.
- Remove **CHUCK KEYS/WRENCHES** from the drill chuck **BEFORE** starting the machine.
- **CLAMP THE WORK SECURELY** to the table before starting the machine.
  - ❖ Attempting to hold the work under the drill with one hand can result in serious and painful injuries.
- Operate drills at the proper speed and feed. Forcing or trying to feed too quickly can cause drills to break or splinter with the chance of serious injuries.
- If work slips from the clamp, never attempt to stop it with your hands. Never reach around or in back of any rotating drill. Use a V-block for round stock.
- Always ensure that the machine has come to a **COMPLETE STOP** and has been switched off before you attempt to change the belt for speed regulation.
- If the drill sticks in the work, stop the motor and rotate the drill by hand to free it from the work.
- File or scrape all burrs from drilled holes Be sure that the file is fitted with a proper handle.
- Always clear away chips and curls with a **HAND BRUSH** – not your hands.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



# Machine Review Sheet

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## Drill Press

### Purpose:

1. To drill holes in wood, plastic, or metal.
2. To serve as a rotating power source for sanding drums.

### Key Words:

Jacobs chuck, chuck key, quill, Archimedean twist bit, spade bit, hole saw, Forstner bit

### Safety: *The following are in addition to the General Safety Rules.*

1. Secure instructor's approval.
2. Safety glasses. Secure loose clothing; remove jewelry. Secure long hair.
3. Maintain 2" margin of safety. Clamp smaller work.
4. Select the appropriate drill speed (see chart). Be sure the machine has stopped before adjusting.
5. Clamp work when drilling metal, plastic, or when drilling holes having a diameter greater than 2".
6. When drilling an edge or end, support the stock to prevent tipping.
7. Use a V block when drilling round stock.
8. Ensure only a bit designed to cut metal is used for drilling holes in metal.
9. Holes deeper than 2" must be made with a twist bit.
10. Ensure that at least 1" of the bit shank is secured by the chuck.
11. Remove chuck key before starting the drill.
12. Rotate the chuck by hand to ensure the bit is clamped square.

### Techniques:

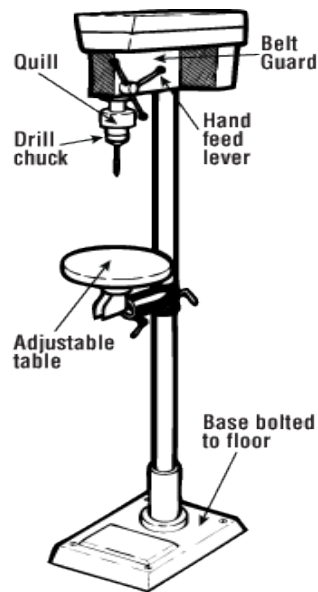
1. Use a sacrificial backer board to control tear-out.
2. Fences and stops to guide work speed up production work.
3. Select the appropriate bit for the type of material being worked, the quality of the hole required, and the depth of the hole required.



## What should you do before using a drill press?

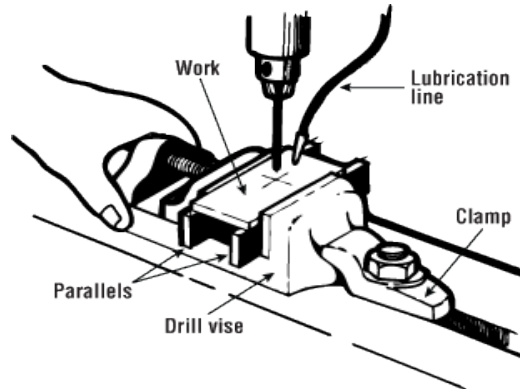
Drill presses can be dangerous if not used properly.

- Read the owner's manual carefully.
- Make sure you understand the instructions and are properly trained before operating a drill press.

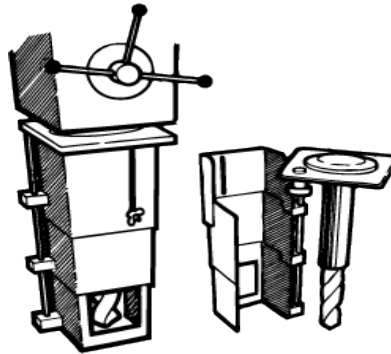


## What are some safe work practices to know when using a drill press?

- Wear appropriate safety glasses.
- Ensure that the drill press has a start/stop button within easy reach of the operator.
- Use a vacuum, brush or rake to remove cuttings.
- Remove burrs and chips from a drilled hole. When making deep holes, clean out the hole frequently.
- Use a clamp or drill vise to prevent work from spinning.
- Make sure the drill bit or cutting tool is locked securely in the chuck. Remove the chuck key before starting the drill press.
- Lubricate drill bit when drilling metal.
- Reduce the drilling pressure when the drill begins to break through the work piece. This action prevents drill from pulling into the work and breaking.
- Keep drill bits clean and sharp. Dull drills are a common cause of breakage.
- Keep floor around the drill press free of oil and grease.



- Keep the working surface clean of scraps, tools and materials.
- Keep guards in place and in good working order.



- Shut off power before removing the drill bit.

## What are some things you should avoid doing?

- Do not wear any loose clothing or ties. Roll sleeves above the elbow to prevent them from being caught in revolving parts. Confine long hair.
- Do not wear gloves, rings, watches, or bracelets while working with a drill press.
- Do not set speeds, adjust, or measure work until machine is completely stopped.
- Do not force the drill with extra pressure.
- Do not leave chuck key in drill chuck. Make adjustments and remove key immediately.
- Do not hold work by hand when drilling holes; secure the work with clamps or vices.
- Do not place hands under the stock being drilled.
- Do not stop rotation of chuck and spindle with your hand.
- Do not remove a broken drill with a centre punch and hammer.
- Do not leave the drill press running unattended.



## DRILL PRESS SPEED CHART

*Recommended operating speeds (RPM)*

Accessory	Softwood (Pine)	Hardwood (Oak)	Acrylic	Brass	Aluminum	Steel
<b>Twist Drill Bits</b>						
1/16" – 3/16"	3000	3000	2500	3000	3000	3000
1.5mm – 5mm	3000	3000	2500	3000	3000	3000
1/4" – 3/8"	3000	1500	2000	1200	2500	1000
6mm – 10mm	3000	1500	2000	1200	2500	1000
7 1/6" – 5/8"	1500	750	1500	750	1500	600
11mm – 16mm	1500	750	1500	750	1500	600
11/16" – 1"	750	500	NR	400	1000	NR
17mm – 27mm	750	500	NR	400	1000	NR
<b>Brad-Point Bits</b>						
1/8"	1800	1200	1500	NR	NR	NR
1/4"	1800	1000	1500	NR	NR	NR
3/8"	1000	750	1500	NR	NR	NR
1/2"	1800	750	1000	NR	NR	NR
5/8"	1800	500	750	NR	NR	NR
3/4"	1400	250	750	NR	NR	NR
7/8"	1200	250	500	NR	NR	NR
1"	1000	250	200	NR	NR	NR
<b>Forstner Bits</b>						
1/4" – 3/8"	2400	700	250	NR	NR	NR
1/2" – 5/8"	2400	500	250	NR	NR	NR
3/4" – 1"	1500	500	250	NR	NR	NR
1 1/8" – 1 1/4"	1000	250	250	NR	NR	NR
1 3/8" – 2"	500	250	NR	NR	NR	NR
<b>Spade Bits</b>						
1/4" – 1/2"	2000	1500	NR	NR	NR	NR
5/8" – 1"	1750	1500	NR	NR	NR	NR
1 1/8" – 1 1/2"	1500	1000	NR	NR	NR	NR
<b>Spade Bits with Spurs</b>						
3/8" – 1"	2000	1800	500	NR	NR	NR



# Observational Checklist



## Drill Press Operation

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. CSA approved safety glasses are worn (bits could break or material could come in contact with face/eyes).		
3. Drill press is unplugged before changing a drill bit.		
4. Remove the chuck key before starting up the drill press or a hand drill.		
5. Ensure material is securely attached to working surface with a clamp before drilling the material.		
6. User has a secure footing and proper stance for drilling material. Both hands are used during drilling.		
7. If drilling a large hole, a smaller pilot hole is drilled first reducing the risk of the drill bit catching on material.		
8. Even pressure is applied while drilling holes allowing the drill bit to bore through the material.		
9. When drilling is completed the drill comes to a stop on its own. Any dust or material from drilling is cleaned up from the working area before leaving.		

# Safety Quiz



## Drill Press

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. When using the drill press, a \_\_\_\_\_ is required when cutting cylindrical stock.
2. Always operate the drill press from the \_\_\_\_\_, never from the \_\_\_\_\_.
3. Make sure your \_\_\_\_\_ or safety glasses are on before you start the machine.
4. Make sure all \_\_\_\_\_ clothes and long \_\_\_\_\_ is restrained.
5. Choose a drill bit that is \_\_\_\_\_ and in good condition.
6. Remove the \_\_\_\_\_ from the chuck before starting the machine.
7. Check for the proper \_\_\_\_\_ for the drill size and material you are working on.
8. \_\_\_\_\_ the work securely before drilling.
9. Never attempt to \_\_\_\_\_ a piece of work if it slips from the clamp.
10. Always make sure the drill press has \_\_\_\_\_ before attempting to change speeds.
11. If the drill sticks in the work piece, \_\_\_\_\_ the motor and rotate the chuck by hand to free it up.
12. Always clear away \_\_\_\_\_ and curls with a \_\_\_\_\_ - not by your bare hands.

### WORD BANK:

sharp, hair, face shield, chips, brush, stopped, shut off, loose, chuck key, speed, clamp, grab, V-Block, front, side

# Student Safety Passport



## Drill Press

### General Conditions

Students must be trained on the safe and proper use of the **Drill Press** before they may begin using it. The student must demonstrate the ability to use the equipment safely and proficiently.

### Personal Protective Equipment

Safety Glasses

Appropriate Footwear [work boots]

Work Gloves

### Possible Risk Factor

Eye injuries

Hand Injuries

Entanglement of clothing and hair

Slipping

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of a **Drill Press**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Drill Press

**OBTAIN “STUDENT TECH PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**CHUCK KEY IS REMOVED**

**CLAMP MATERIAL SECURELY TO WORKING  
SURFACE BEFORE DRILLING**



# Hand Tools

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**Hand tools in poor condition are responsible for a vast number of injuries.**

- Wear **EYE PROTECTION** whenever using hand tools.
- Have a proper storage location for your tools to protect them from loss or damage. After use, clean and **RETURN THEM TO THEIR PROPER PLACE** so they are always ready when you need them.
- Never leave tools on floor, hanging over edges, on ramps or hoists where they could be forgotten or cause a tripping hazard.
- When tools become worn or damaged, they should be repaired or replaced immediately. Show your instructor.
- Use chisels, knives, blades that are sharp. Do not use blunt tools.
- Use tools only for their intended purpose. For example, screwdrivers should not be used as pry bars – if they bend under load they are no longer useful and may be dangerous to use as a screwdriver.
- Files should not be used as pry bars - they are extremely brittle and when breaking will release fragments which could injure or blind you.
- **NEVER STAND BEHIND** anyone who is swinging a hammer. If you have to observe what is being done, stand off to the side out of the way of the hammerhead

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

# Machinery Review Sheet

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## Hand Tools

### Purpose:

1. To assist in the repair and service of vehicles.
2. To aid in fabrication of student projects.

**Key Words:** tool rack/board, non-sparking, mushroomed, push, pull

**Safety:** *The following are in addition to the General Safety Rules.*

1. Always use a CSA approved face shield or safety glasses when using a striking type of tool (i.e. hammer or chisel).
2. Hand tools have a proper storage location. After each use, clean the tool in order to inspect for damage and return it to its proper place.
3. Select the right tool for the job.
4. Do not use screwdrivers or files as pry bars. They may bend or break.
5. Always hammer a chisel away from you. This will avoid bodily injury if the chisel should slip.
6. Never stand behind anyone who is swinging a hammer. Stand to one side to prevent being struck.

### Techniques:

1. A proper storage system such as a tool board, or tool crib will allow you to keep track of the hand tools in the shop. The tools should be inspected regularly to ensure none of them are worn or damaged.
2. Special use items should be kept in a locked cabinet i.e. snap ring pliers, torque wrenches.
3. As with all hand tools, a certain amount of 'skill' must be learned before the tool will feel comfortable in the student's hand. Students often underestimate the amount of torque or force that a hand tool can put out. This can often lead to stripped or broken fasteners. Prior knowledge or experience cannot be expected or taken for granted. Some students may be in a senior level class, but may have never used a specific tool.

# Student Handout

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## Hand Tools

There are many types of hand tools in the Transportation Shop. Each tool has a specific purpose and was designed for this. Although there are many hand tools in the shop, they share similar characteristics.

All hand tools must be in good working order and not damaged or worn; if any tool appears to be damaged or worn it must be brought to the teacher's attention immediately. All hand tools have a specific storage space whether it be on a tool board, in a tool box drawer, or in a tool room and they need to be cleaned and returned at the end of the period.

No matter what the job, it is important to remember that, if improperly used, hand tools can be extremely dangerous. They can cause many serious injuries to the eyes, hands, and face. Realizing this, the student must always observe the following safety rules when using "Hand Tools"

### Safety Rules:

- Do not use a hand tool for any other job than one for which it was designed.
- Return the hand tools to their proper places after each use.
- Report a damaged hand tool to the teacher.
- Clean tools after use; a clean hand tool is a safe hand tool.
- Understand each tool's proper use before you begin. If you have any problems ask your teacher for help.

# Observational Checklist



## Hand Tools

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Safety glasses worn.		
2. Checks tools - must be in good working order and not damaged or worn		
3. Always points sharp hand tools away from the body.		
4. Selects tools appropriate for the job.		
5. Proper force is used when using a hand tool.		
6. Tools are returned to storage and not left as a tripping hazard on the shop floor		
7. Checks the tool for sharpness and does not use blunt instruments.		

# Safety Quiz

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## Hand Tools

Name \_\_\_\_\_ Date: \_\_\_\_\_

1. Hand tools in \_\_\_\_\_ condition are responsible for many injuries.
2. After use, \_\_\_\_\_ and return the tool to its proper place.
3. All \_\_\_\_\_ should be removed before beginning work.
4. \_\_\_\_\_ are the cause of many accidents. Use only sharp tools that are in good condition.
5. Always push a wood chisel \_\_\_\_\_ from yourself.
6. Keep \_\_\_\_\_ hands on the chisel, unless striking it with a mallet.
7. Use the \_\_\_\_\_ tool for the job.
8. Always use a file with a \_\_\_\_\_. Protect your hand from serious injury.
9. Wear \_\_\_\_\_ whenever you use striking tools.
10. Never \_\_\_\_\_ behind a person swinging a hammer.

### WORD BANK:

eye protection, both, blunt cutting tools, handle, stand, poor, clean, away, jewelry, proper

# Student Safety Passport



## Hand Tools

### General Conditions

Students must be trained on the safe and proper use of the **Hand Tools** before they may begin using it. The student must demonstrate the ability to use the equipment safely and proficiently.

### Personal Protective Equipment

Safety Glasses

Appropriate Footwear [work boots]

Work Gloves

### Possible Risk Factor

Eye injuries

Hand Injuries

Entanglement of clothing and hair

Slipping

This is to certify that:

\_\_\_\_\_ **(print student name here)**

has been properly trained in the operation of a **hand tool**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Hand Tools

**OBTAIN A STUDENT TECH PASS**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ALWAYS USE A CSA APPROVED FACE SHIELD OR SAFETY GLASSES WHEN USING A STRIKING TYPE OF TOOL (i.e. hammer or a chisel).**

**AFTER EACH USE, CLEAN THE TOOL IN ORDER TO INSPECT FOR DAMAGE AND RETURN IT TO ITS PROPER PLACE.**

**DO NOT USE SCREWDRIVERS OR FILES AS PRY BARS.**

**ALWAYS HAMMER A CHISEL AWAY FROM YOU.**

**NEVER STAND BEHIND ANYONE WHO IS SWINGING A HAMMER.**

# Machining Stock to Dimension



Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. a) Which machine do we use to cut boards to rough length?

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b) Why do we not cut them to final length right away?

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2. a) Why do we avoid ripping warped, twisted, or bowed wood on the tablesaw?

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b) Which machine should be used to rip warped wood?

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# Machining Stock to Dimension



3. a) Explain how twisted boards can be flattened on the jointer.

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b) Why can the thickness planer not remove twist from a board?

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4. When thickness planing, why should one flip boards with each successive pass?

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5. Why should the angle of the jointer fence be checked before jointing an edge?

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6. a) After ripping on the table saw, the edge is planed on the jointer. Why?

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# Machining Stock to Dimension



b) How many passes should be made?

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7. Lonnie Bird uses the table saw to cut boards to length. Which machine do we use in the school shop?

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8. What is the purpose of:

a) first: crosscutting one end of a board; before marking out,

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b) cutting the other end to length?

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# Mitre Saw

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- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate. No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate the mitre saw without the instructor's permission.
- Follow the manufacturer's instructions for changing tool accessories.
- Clamp all material firmly and properly.
- Ensure you are aware of the blade path before you make your cut.
- When you cut short pieces make sure your left hand is clear of the blade path.
- Watch for kick back when cutting short pieces.
- Long stock pieces should be supported safely.
- Students who are left handed must use their right hand for cutting operations.
- When making angle cuts ensure the blade has adequate clearances.
- Your body position should always be left of the blade assembly when operating this saw.
- When using a sliding mitre saw, ensure the blade clears stock sizes before cutting operations.
- Make sure all guards are in place and properly adjusted.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



## Mitre Saw

### Purpose:

To mitre and crosscut boards. Some machines have a bevel function and can cut bevels and mitres in a single pass (compound mitre). Some sliding saws have a dado function. Do not use the school mitre saw for cutting rough lumber. The installed blade is designed for very clean finish cuts.

**Key Words:** bevel, mitre, compound mitre

**Safety:** *The following are in addition to the General Safety Rules.*

1. Secure instructor's approval.
2. Wear safety glasses. Secure loose clothing; remove jewellery; secure long hair.

### All Mitre Saws

1. Maintain a 3" margin of safety between the blade and your hands. Do not cross arms.
2. Support long work.
3. Position fences to clear the blade, support the stock, and not cause trapped offcuts.
4. When using a stop block, the stock must be secured to prevent trapped offcuts.
5. Ensure there is 6" of stock against the fence on the side the stock is being secured.
  - i. Clamp shorter work.
6. Before starting, ensure the blade is not in contact with the work.
7. Ensure mitre arm is locked before commencing.
8. Remove all offcuts before commencing.
9. To minimize flying offcuts, allow the blade to stop before lifting it out of the cut.
10. When cutting warped or curved wood, ensure that the stock is supported by the table and fence at the point it is being cut.

**Continued ...**



## Mitre Saw

### Sliding Compound Mitre Saws

1. Ensure the bevel handle is locked and the blade will clear the fences.
2. When using the sliding feature, pull the saw up and out without contacting the work.
3. Start the saw; push it down into the work and then back towards the fence.

### Techniques:

1. Clear away any sawdust build-up. Ensure the stock is tight against the fence and stop block.
2. Good face should be up. Back-up boards on the fences and table surface minimize tear-out and help line up the saw with layout lines.
3. Tighten rail lock when not using the sliding function to remove play.
4. When angles are being cut, the saw's action tends to pull the stock into the blade. Minimize this by clamping stock and making an initial cut close (1/8") to the layout line (on the "waste" side!).

# Student Handout

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## Mitre Saw

### What should you do before using a mitre saw?

Mitre saws can be dangerous if not used properly.

- Make sure you know and understand the instructions before attempting to use any tool or machine.
- Learn the applications and limitations before use.

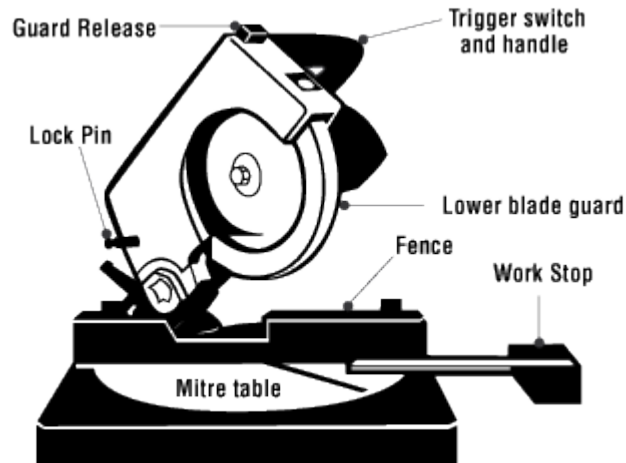
### What safety precautions should you follow when using a mitre saw?

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles).
- If work is dusty, use a respirator or dust mask.
- Wear appropriate hearing protection.
- Wear protective footwear when required.
- Keep one hand on the trigger switch and handle and use the other hand to hold the stock against the fence.
- Keep hands out of the path of the blade.
- Keep guards in place and in working order.
- Remove adjusting keys and wrenches.
- Use a crosscut or combination blade.
- Ensure that the blade rotates in the correct direction.
- Ensure that the blade and arbor collars are secure and clean. Recessed sides of collars should be against blade.
- Keep blade tight, clean, sharp and properly set so that it cuts freely and easily.
- Allow motor to reach full speed before cutting.
- Follow instructions for lubricating and changing accessories.
- Keep the work area clean. Cluttered areas and benches invite accidents.
- Keep the work area well lit.
- Reduce the risk of unintentional startup. Make sure saw switch is in OFF position before plugging in.
- Unplug tools before servicing and when not in use.
- Check for damage. Repair or replace damaged parts.
- Keep motor air slots clean and free of chips.
- Use only the accessories designed for the specific saw and job.

**Continued ...**



## Mitre Saw



### What should you avoid when using a mitre saw?

- Do not operate the saw on ground.
- Do not cut pieces smaller than 20 cm (8 in.) in length.
- Do not cut "free hand." The stock should lie solidly on the table against the fence.
- Do not reach around or behind the saw blade.
- Do not take your hand away from the trigger switch and handle until the blade is fully covered by the lower blade guard.
- Do not overreach. Keep proper footing and balance at all times.
- Do not force the saw. The saw cuts better and more safely at the rate for which it was designed.
- Do not leave the saw until it has stopped completely. Turn the power off and unplug the saw.
- Do not use electric tools in damp or wet locations.
- Do not operate electric tools near flammable liquids or in gaseous or explosive atmospheres. Sparks may ignite fumes.

# Observational Checklist



## Mitre Saw

*Mastery is required.*

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety glasses worn.		
3. Machine tables are clear of tools, stock and debris. The area around the machine is clear.		
4. Student ensures saw carriage is up and guard is in place before starting machine.		
5. Stock is held firmly against the fence and table		
6. Hands are only on the wood and the handle.		
7. Material between stop block and blade is secured.		
8. Controlled feed speed. Stock is cut and returned to the upright position.		
9. Saw is shut off and the table is cleared of off cuts.		



# Safety Quiz



## Mitre Saw

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Secure the mitre saw to the work surface with \_\_\_\_\_ or bolts.
2. Remove all \_\_\_\_\_ and tie back \_\_\_\_\_ hair.
3. Your body should be \_\_\_\_\_ of blade assembly.
4. Ensure the blade clears the \_\_\_\_\_ before cutting.
5. Always use your \_\_\_\_\_ hand to operate the trigger.
6. Ensure the \_\_\_\_\_ is functioning correctly before operating the saw.
7. When making \_\_\_\_\_ cuts ensure the blade has adequate clearances.
8. \_\_\_\_\_ pieces should be supported.
9. Watch for \_\_\_\_\_ when cutting small pieces.
10. Keep your \_\_\_\_\_ clear of the blade path when cutting short piece that cannot be clamped down.

### WORD BANK:

kickbacks, long, left hand, clamps, jewellery, left, right, guard, angular, stock ,left

# Student Safety Passport



## Mitre Saw

### General Conditions

Students must be trained on the safe and proper use of a **Mitre Saw** before they may begin using it. The student must demonstrate safe and proficient procedures.

### Personal Protective Equipment

Safety Glasses

Breathing Protection [dust mask]

Coveralls

Hair net [long hair only]

### Possible Risk Factor

Clothing or long hair [entanglement]

High Speed Sharp blade [severe cuts]

Fine dust

Fire Hazard

Small projectiles [wood splinters or debris]

- ✓ The student has been trained on this equipment.
- ✓ The student understands the required personal protective equipment to operate this equipment.
- ✓ The student is aware of the possible risk factors

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of **Belt and Disk Sanders**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Mitre Saw

**OBTAIN “STUDENT TECH PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**VERIFY GUARDS ARE IN PLACE**

**MAINTAIN A 3” MARGIN OF SAFETY  
BETWEEN HANDS AND BLADE**

# Pedestal Grinder

---



- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate. No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate any grinder without the instructor's permission.
- Ensure all safety guards are in place
- Be aware of the position of the **ON/OFF** switches and emergency **STOP** button.
- Pedestal must be bolted to the floor
- Always check the clearance of the tool rest before starting work. Clearance should never be more than 3mm (1/8 inch). Always set the tool rest clearance when the wheel is not turning.
- When mounting or replacing any grinding wheel, always ensure that it fits properly on the spindle. Never use a grinding wheel that is loose on the shaft.
- In securing the wheel to the spindle be sure that the blotters are affixed to both sides of the wheel and that washers and nuts are of the correct size.
- When starting up any grinding wheel, stand to one side out of line with the wheel especially if it is a new one.
- Only replace a grinding wheel with one that has the same speed rating. Excessive speed on lower speed rated grinding wheels can cause the wheel to shatter.
- Only grind on the face of the wheel, Use the entire face to avoid grooving the wheel.
- Always feed the work into the wheel gradually. Too much pressure or striking the wheel suddenly may cause it to fracture.
- Shut off machine immediately if it begins to chatter or vibrate. Never use tools or hands to stop any grinder. Report chattering and vibration to the teacher.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

# Machine Review Sheet

---



## Pedestal Grinder

### Purpose:

1. To grind metal prior to welding to prep the surface, or after welding to clean up a weld.
2. To cut steel when equipped with a metal cutting stone.
3. To shape steel.
4. To sharpen tools and bits.
5. To clean metal when equipped with a wire wheel.

**Key Words:** pneumatic, electric, grinder stones, grinder wheels, tools rest, dressing the stone

**Safety:** *The following are in addition to General Safety Rules.*

1. Always use a CSA approved face shield or safety glasses when grinding.
2. On a bench grinder, check the clearance to the tool rest before starting your work. Clearance of 1/8" or 3mm. is acceptable.
3. Check grinder disks for any flaws.
4. Stop the grinder immediately if it begins to chatter or vibrate
5. Stand to one side of the stone on the bench grinder and hold small objects with "Vise Grip" pliers.
6. Make every effort to ensure that sparks from the grinder are not hitting other workers in the area.
7. Always allow the grinder to reach full speed before using it.

### Techniques:

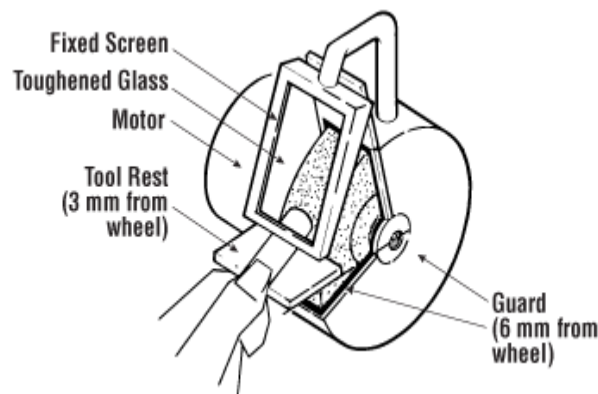
1. Always check that the stones on the grinders are rated for the RPM of the grinder in use.
2. When using a bench grinder only use the face of the stone, and not the side.
3. Check the cords on the grinder prior to plugging them into an outlet.



## Pedestal Grinder

What safety procedures should you follow when using pedestal grinders?

- Fasten pedestal grinders securely.
- Ensure all the guards are in place and secure before using a grinder.
- Adjust tool rests to within 3 mm (1/8 in.) of wheels. Never adjust rests while wheels are moving. Work rest height should be on horizontal centre line of the machine spindle.
- Maintain 6 mm (1/4 in.) wheel exposure with a tongue guard or a movable guard.
- Check that wheels have blotters on each side.
- Check the wheel fits properly to the spindle when mounting. If it is loose, get another wheel.

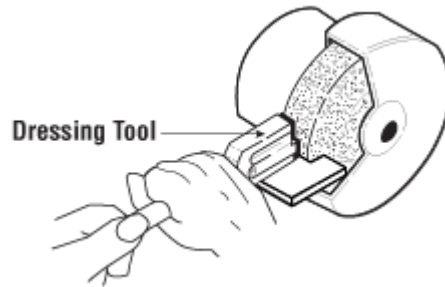


- Stand to one side of the grinder until the wheel reaches operating speed.
- Bring work into contact with the grinding wheel slowly and smoothly, without bumping.
- Apply gradual pressure to allow the wheel to warm up evenly. Use only the pressure required to complete a job.
- Move the work back and forth across the face of the wheel. This movement prevents grooves from forming.
- Wheels are made only for grinding certain items. Do not grind rough forgings on a small precision grinding wheel.

**Continued ...**



## Pedestal Grinder



- Dress wheels regularly. Do frequent, light dressings rather than one heavy dressings.
- Support dressing tools so you can apply leverage without undue effort. With revolving cutter dressing tools use the lugs as anchors.
- Replace worn wheels if you cannot dress it.
- Ensure the grinder speed does not exceed the operating speed marked on the wheel.
- Visually inspect wheels for possible damage before mounting.
- Wear proper personal protective equipment:
  - eye, ear and face protection,
  - metatarsal safety boots, where required,
  - respiratory protection may be required, depending on the work.
- Wear gloves only where necessary.

### What should you avoid when using pedestal grinders?

- Do not use a wheel that has been dropped.
- Do not use a wheel that does not fit properly to the spindle.
- Do not use excessive force to tighten the nut of the wheel. The force can crack the wheel.
- Do not grind wood, plastics and non-iron metals on ordinary wheels.
- Do not leave grinding wheels standing in liquids. The liquid can cause balance problems.
- Do not grind on the side of a regular wheel.

# Observational Checklist



## Pedestal Grinder

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Personal Protective Equipment worn.		
3. Area is free of flammable hazards that could be ignited by flying sparks.		
4. Work is firmly secured into place or properly supported on the tool rest.		
5. Allows grinding wheel to reach full speed before gradually feeding in work.		
6. Has a secure footing and proper stance for grinder operation.		
7. Material is held with two hands or vice-grips for small pieces of material.		
8. Aims sparks away from other people.		
9. When finished grinding, raises or removes the material away from the grinding wheel and allows the wheel to stop on its own.		
10. Newly ground material will be sharp and hot. Allows material to cool down before handling. Gloves, vice-grips or tongs are used when necessary to handle material.		



# Safety Quiz



## Pedestal Grinder

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Always use a \_\_\_\_\_ or goggles when grinding.
2. Inspect the \_\_\_\_\_ of the wheel before starting the machine.
3. Check the \_\_\_\_\_ of the tool rest. It should not exceed \_\_\_\_\_ of an inch.
4. When starting up the grinder always \_\_\_\_\_ to one side, not directly in front of the wheel.
5. Check the \_\_\_\_\_ of the wheel. Excessive revolutions could cause the wheel to shatter.
6. Only use the \_\_\_\_\_ of the wheel.
7. Feed the work into the wheel \_\_\_\_\_.
8. Shut off the machine immediately if the wheel begins to \_\_\_\_\_ or vibrate.
9. Never use the \_\_\_\_\_ or hands to stop any grinder.

### WORD BANK:

Stand, clearance, one-eighth, material, speed, face shield, condition, face, gradually, chatter

# Student Safety Passport



## Pedestal Grinder

### General Conditions

Students must be trained on the safe use of a **Pedestal Grinder** before they may begin using it. The student must demonstrate to the teacher proficiency and the safe work procedures that must be followed before usage.

### Personal Protective Equipment

- Face shield
- Safety glasses
- Leather welding gloves
- Coveralls or leather jacket/apron
- Safety footwear

### Possible Risk Factors

- Hot metal
- Eye injury
- Small projectiles
- Hand injuries
- Cuts and Abrasions
- Entanglement

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of a **Pedestal Grinder**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

---



## Pedestal Grinder

**OBTAIN “STUDENT TECH PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**ENSURE TOOL REST IS WITHIN  
3MM OF THE WHEEL**

**ONLY GRIND STEEL**

**NEVER STAND IN LINE WITH GRINDING WHEEL**

**ALLOW GRINDER TO REACH FULL SPEED  
BEFORE GRINDING**

**DO NOT GRIND USING THE SIDE OF THE WHEEL**

# Portable Grinder

---



- Wear Personal Protective Equipment (PPE) **INCLUDING GLOVES AND FACE SHIELD OR GLASSES** when using a grinder.
- Check the grinder disk for any flaws before using.
- Ensure that the grinder disk is secured and seated properly on the arbor.
- Check the immediate area for any fire hazards such as flammable materials, liquids or batteries.
- Make sure you are at least 6 metres (20 feet) away from other workers.
- Grip the grinder solidly with two hands (beware of the torque). Also make sure you have a solid stance before starting to grind.
- Always start the grinder off the work.
- Aim the sparks towards the floor and away from others.
- When you have finished grinding raise the grinder off the work and allow it to stop on its own.
- If the grinder is dropped during use it should be thoroughly inspected by the teacher before being used again.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

# Machine Review Sheet

---



## Portable Grinder

### Purpose:

1. To grind metal prior to welding to prep the surface, or after welding to clean up a weld.
2. To cut steel when equipped with a metal cutting stone.
3. To shape steel.
4. To sharpen tools and bits.

**Key Words:** pneumatic, electric, grinder stones, grinder wheels, tools rest, dressing the stone

**Safety:** *The following are in addition to General Safety Rules.*

1. Always use a CSA approved face shield or safety glasses when grinding.
2. Check disks for any flaws.
3. Stop the grinder immediately if it begins to chatter or vibrate
4. Do not use on small pieces of material.
5. Make every effort to ensure that sparks from the grinder are not hitting other workers in the area.
6. Always allow the grinder to reach full speed before using it.

### Techniques:

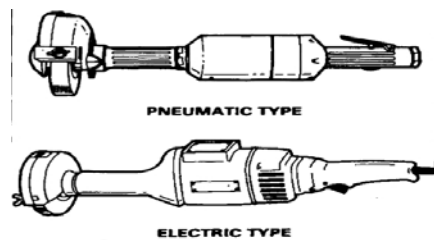
1. Always check that the stones on the grinders are rated for the RPM of the grinder in use.
2. Check the cords on the grinder prior to plugging them into an outlet.
3. Always use both hands to operate a portable grinder.



## Portable Grinder

### *What safety precautions should you follow when using a portable grinder?*

- Guards must be provided and adjusted to protect you. Replace damaged guards because if an abrasive wheel breaks while rotating, it can cause a serious injury.
- Clean and service grinders according to manufacturers' recommendations. Record all maintenance for grinders.
- Ensure that a machine will not operate when unattended by checking the dead-man (constant pressure) switch.
- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles) to protect against flying particles. Gloves, aprons, metatarsal safety boots, and respiratory protection may be required, depending on the work.
- Ensure the floor around the work area is clean.
- Do not use wheels that are cracked or those that excessively vibrate.
- Do not operate grinder on wet floors.
- Use both hands when holding the grinder.
- Keep the power cord away from the grinding wheel and the material being ground.



Continued ...



## ***When and how should you check the speed of the wheel?***

- The maximum speed in revolutions per minute (rpm) is marked on every wheel. Never exceed this speed.
- Check that the wheel speed marked on the wheel is equal to or greater than the maximum speed of the grinder.
- Measure the speed of any new machine. Take several readings.
- Measure the speed of governor-controlled air-driven grinders after twenty hours of use or every week, whichever comes first. Measure the speed after any repairs.
- Measure the speed of electrically driven grinders monthly and after repairs.

## **What should you do when using portable grinders?**

- Check that grinders do not vibrate or operate roughly.
- Use racks or hooks to store portable grinders.
- Stand away from the wheel when starting grinders. Warn co-workers to do the same.
- Inspect all wheels for cracks and defects before mounting.
- Ensure that the mounting flange surfaces are clean and flat.
- Ensure the wheel guard is in place while operating the grinder.
- Use the mounting blotters supplied.
- Run newly mounted wheels at operating speed for 1 minute before grinding.
- Wear appropriate eye, ear and face protection. Use other personal protective equipment or clothing, as required under the circumstances.

## **What should you avoid when using portable grinders?**

- Avoid using grinders near flammable materials.
- Do not clamp portable grinders in a vise for grinding hand-held work.
- Do not use any liquid coolants with portable grinders.
- Do not force wheels onto a grinder that is the wrong size or change mounting hole sizes.
- Do not tighten the mounting nut excessively. Do not put the grinder on the floor or working surface until the wheel has stopped turning.
- Do not keep any materials close to the grinding wheel when it is not in use.

# Observational Checklist



## Portable Grinder Operation

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Personal Protective Equipment worn.		
3. Area is free of flammable hazards that could be ignited by flying sparks.		
4. Work is firmly secured into a vise.		
5. Allows grinding wheel to reach full speed before gradually feeding into work.		
6. Has a secure footing and proper stance for grinder operation.		
7. Grinder is held with two hands.		
8. Aims sparks away from other people.		
9. When finished grinding, removes the grinder from the material allows the wheel to stop on its own.		
10. Newly ground material will be sharp and hot. Allows material to cool down before handling. Gloves, vice-grips or tongs are used when necessary to handle material.		



# Safety Quiz



## Portable Grinder

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Always use a \_\_\_\_\_ or goggles when grinding.
2. Inspect the \_\_\_\_\_ wheel before starting the machine.
3. Check the \_\_\_\_\_ for flammable hazards. They could be \_\_\_\_\_ by a spark.
4. When starting up the grinder always \_\_\_\_\_ the wheel to reach \_\_\_\_\_ speed.
5. Check the \_\_\_\_\_ of wheel. Excessive revolutions could cause the wheel to shatter.
6. Always use both \_\_\_\_\_ while operating the portable grinder.
7. Feed the work into the wheel \_\_\_\_\_.
8. Shut off the machine immediately if the wheel begins to \_\_\_\_\_ or vibrate.
9. Never use the \_\_\_\_\_ to stop the grinder wheel.

**WORD BANK:** Allow, condition, grinder, ignited, operate roughly, material, object, maximum, hand, gradually, CSA Approved Face Shield

# Student Safety Passport



## Portable Grinder

### General Conditions

Students must be trained on the safe and proper use of **4", 5", 7" Portable Grinders** before they may begin using it. Proper guards must be in place before this equipment is used. The student must demonstrate safe and proficient procedures.

### Personal Protective Equipment

- Safety glasses or full face shield
- Industrial work gloves
- Coveralls or apron
- Safety footwear
- Hearing protection

### Possible Risk Factor

- Small projectiles [Metal cuttings or debris]
- Entanglement
- Hearing loss [prolonged use without PPE]
- Hot metal
- Cuts and abrasions
- Hand and wrist injuries

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of **4", 5", 7" Portable Grinders**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## PORTABLE GRINDER

**OBTAIN “STUDENT TECH PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**GRINDING WHEEL MUST REACH FULL SPEED**

**USE BOTH HANDS**

**NOT TO BE USED**

**NEAR FLAMMABLE MATERIALS**

# Radial Arm Saw

---



- Do not operate the radial arm saw without the instructor's permission.
- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate.
- No loose clothing, long hair or jewelry is allowed in the shop.
- Follow the manufacturer's instructions for changing tool accessories.
- Be aware of the position of the **ON/OFF** switches and emergency **STOP** button.
- Make sure the floor is clear in the work area.
- Check the blade for flaws (replace if damaged, worn, or dull). Make sure power is off and the blade has stopped before making any adjustments.
- Wear a dust mask when cutting treated wood or when there is a fine dust hazard.
- Stand clear of possible kickback and keep your hands clear of the blade path.
- Before cutting, inspect the stock for loose knots, metal, or any other hazards.
- Stock must be held firmly on the table and against the fence for all crosscutting operations.
- The ends of long boards must be supported level with the table.
- Use table extensions or hold down clamps to control long stock.

**Continued ...**

# Radial Arm Saw

Page 2



- Never cut more than one piece of stock at a time (don't stack).
- Never cut stock that is shorter than the blade diameter or stock that doesn't lay flat on the table.
- Make sure all guards are in place and function properly. Secure the fence position before beginning.
- Keep the guard and anti-kickback device in position. Do not remove them without your instructor's permission.
- Keep your hands a safe distance away from the path of the saw blade.
- Always return the saw to the rear of the table after completing a crosscut or mitre cut. Never remove stock from the table until the saw has been returned.
- Shut off the motor and wait for the blade to stop before making any adjustments. Be sure the blade has stopped before you leave the machine.
- The table should be kept clear of scrap pieces and large amounts of saw dust.
- Never use the radial arm saw for making rip cuts.
- Turn off the saw to clear any materials from near the blade.
- Change blade if you notice smoking, burning, or wavering during cut. Turn off saw if you encounter any unusual problems or sounds.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCT***

# Machine Review Sheet

---



## The Radial Arm Saw

### Purpose:

1. The radial arm saw is used strictly for cross-cutting (e.g. squaring the ends of boards, cutting boards to length, dadoing, rough cross-cutting). NO RIPPING.

**Key Words:** Rip, crosscut, stop block, trapped off cut, cup, bow, crook, squaring stock

**Safety:** *The following are in addition to the General Safety Rules.*

1. Secure instructor's approval.
2. Safety glasses.
3. In the school shop, the Radial Arm is used for crosscutting only.
4. Maintain a 3" margin of safety between the blade and your hands. Keep hands out of red "no go" zone.
5. Before starting, ensure the saw carriage is against the stop.
6. Hold stock firmly against the table and fence
7. The saw carriage should be advanced only as far as required to cleanly sever the wood.
8. When using a stop block, the stock must be secured to prevent trapped offcuts.
9. Control the rate of cut by keeping your advancing arm straight.
10. Do not cross arms.
11. When cutting warped wood: The stock must be supported by the table and the fence at the point where it is being cut.

### Techniques:

1. Ensure stock is tight against the fence and stop block. Clear away any build-up of sawdust.
2. Good face up.
3. Before squaring a board, inspect the ends for checking.



## Radial Arm Saw

### What should you do before using a radial arm saw?

A radial arm saw can be dangerous if not used properly.

- Read the owner's manual carefully.
- Make sure you understand instructions before attempting to use any tool or machine.
- Learn the applications and limitations before use.

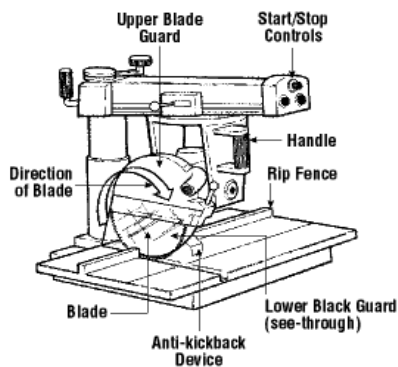
### What safety procedures should you follow when using a radial arm saw?

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles).
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area.
- Wear protective footwear when required.
- Feed stock against the direction of the blade (the blade should move downward when viewed by the operator).
- Only use saw blades rated at or above the speed of the saw arbour. (An arbour is the attachment from motor to blade)
- Use only the accessories designed for that specific saw and application.
- Ensure the guard consists of two parts:
  1. Upper hood type that covers arbour
  2. Lower guard that rides on the stock, adjusting automatically to the thickness being cut.
- Stand on the handle side when cross cutting. Pull the cutting head with the hand nearest the handle and maneuver the stock with the other hand.
- Make sure the hand holding the stock is never in line with the blade.
- Return the cutting head completely to the back of the saw table after each cut. The saw should be designed so that the blade will not move forward under its own weight or if the machine is vibrating.
- When ripping, make sure that the overall length of the saw table (both infeed and outfeed) is twice the length of the longest pieces of lumber.
- When ripping, make sure that the stock is fed against the direction of the blade (from the side where the saw blade rotates upward toward the operator). The blade should extend slightly into the table. The motor head must be locked at the correct height and angle.



## Radial Arm Saw

- Clamp stock to the table on one side of the saw blade, when making mitre, bevel or compound mitre cuts. Clamping prevents the wood from sliding along the fence during the cut.
- Turn off the saw when making any adjustments or changes in the set up.
- Make measurements by placing the wood to be cut against the stop gauge. When measuring with a tape measure or ruler is necessary, turn off the saw until the measuring is complete.



### What should you avoid when working with a radial arm saw?

- Do not use radial arm saws for ripping unless the spreader (riving knife) and anti-kickback devices are provided and properly adjusted.
- Do not take your hand away from the operating handle unless the cutting head is behind the fence.
- Do not remove the stock from a saw table until the blade has been returned to its "resting" position at the back of the saw table. Use a stick or brush to remove scrap from the saw table.
- Do not cut "free hand". Use the back guide or fence, or other device to keep the workpiece from moving.
- Do not use cracked or dull blades.
- Do not leave a running saw unattended - leave only after the saw has been turned off and it has come to a complete stop.



# Observational Checklist



## Radial Arm Saw Operation

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety glasses worn.		
3. Machine tables are clear of tools, stock and debris. The area around the machine is clear.		
4. Student ensures saw carriage is against stop before starting machine.		
5. Stock is held firmly against the fence and table: convex edge against the fence, convex face against the table.		
6. Hands outside of red zone. Arms are not crossed.		
7. Material between stop block and blade is secured.		
8. Controlled feed speed. Stock is just severed and the carriage returned against the stop.		
9. Saw is shut off and the table is cleared of off cuts.		

# Safety Quiz



## Radial Arm Saw

Name: \_\_\_\_\_ Date: \_\_\_\_\_

While each machine will have specific rules regarding safe use, there are general rules which apply to all machines. **The two most important are:**

1. Wear your eye protection and ensure your hair, clothes, and jewelry are secured.
2. Never use a machine or perform an operation unless you have been given explicit permission.

---

1. Which operation is never performed on the radial arm saw? (circle one)

a) ripping

b) crosscutting

2. A bowed board is to be crosscut on the radial arm saw. The concave side of the board is down. (It forms a "frown")

a) Is this a safe cut? \_\_\_\_\_

b) Why or why not?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Why must the portion of stock between the blade and the stop-block be secured when cross-cutting on the radial arm saw?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Student Safety Passport



## Radial Arm Saw

### General Conditions

Students must be trained on the safe and proper use of Radial Arm Saws before they may begin using it. The student must demonstrate the ability to use the equipment safely and proficiently. All guards and safety devices must be in place and ventilation system must be operating free and clear.

### Personal Protective Equipment

- Safety Glasses
- Safety footwear
- Dust Masks
- Hearing Protection

### Possible Risk Factor

- Small projectiles [wood chunks and chips]
- Slips and falls [wood dust]
- Contact with moving blade
- Eye injuries
- Abrasions [wood splinters]
- Hearing loss [high noise area; unprotected ears]
- Entanglement of clothing or long hair
- Serious hand injuries
- Fine wood dust

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of a **Radial Arm Saw**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Radial Arm Saw

**OBTAIN “STUDENT TECH PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**VERIFY GUARDS ARE IN PLACE**

**MAINTAIN A 3” MARGIN OF SAFETY  
BETWEEN HANDS AND BLADE**

# Scroll Saw



- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate. No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate the Scroll Saw without the instructor's permission.
- Follow the manufacturer's instructions for changing tool accessories.
- Be aware of the position of the on/off switches and emergency **STOP** button.
- Ensure that the correct blade is being used for the type and size of material. Use the correct speeds for the material being cut (variable speed machines).
- When pushing the work through do not force the piece. Keep fingers clear of the blade path. Use both hands and keep fingers at least 10 cm. (4 in.) from the blade at all times.
- Never pull or force a jammed piece through the equipment. Shut the power off and then carefully dislodge the piece.
- If the blade is dull change it. (Make sure the machine is locked out). Make all adjustments with the power off.
- Make sure the hold down is resting on the work piece.
- Plan your cuts carefully. Saw curves gradually. Sudden twists will cause the blade to bind or break. Use relief cuts if necessary. Always make a short cut first. Avoid backing out of cuts with the power on. Backing out of a cut may cause the blade to bind.
- If the blade breaks, turn the power off immediately and step back. Inform the instructor immediately.
- Remove scrap pieces from the table only after the blade has stopped.
- Always operate the saw from the front never from the side. Keep your hands beside or behind the blade; never in front. Do not leave the scroll saw until the blade has stopped.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***

# Machine Review Sheet

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## Scroll Saw

### Purpose:

1. A scroll is used to cut irregular shapes from wood, plastics and metals.
2. Our scrolls are set up specifically for cutting wood only.

**Key Words:** stock, blades, curve, relief cuts, tension

**Safety:** *The following are in addition to the General Safety Rule;*

1. Wear eye protection at all times when using the scroll saw.
2. Keep your work area clean and uncluttered.
3. Select the correct speed and type of blade for the work you are doing.
4. Install the blade with the teeth pointing downward.
5. Make all adjustments only when the machine is turned off and unplugged from the power source. Adjust the blade tension before starting the saw.
6. Never cut boards with nails, staples, or foreign materials.
7. Adjust the hold down foot so it presses lightly on the surface of the wood you are cutting. This keeps your wood from vibrating.
8. Have the teacher check your setup before turning on the scroll saw.
9. Cut just slightly to the scrap side of your line of cut.
10. The wood must NOT be in contact with the blade when you turn the machine on.
11. Keep your hands, fingers, and body parts well out of the way of the blade. Never have your hand or fingers in the line of cut.
12. Move scrap pieces away from the blade with a push stick, not your fingers.
13. Never cut round stock without the proper holding device (jig) to keep it from rolling unintentionally.
14. If the blade breaks, turn off the machine and notify the instructor.
15. Give the blade time to do its job. The teeth are small and you must feed your work slowly so you don't break the blade. Don't force your wood into the blade. This is especially true if you are cutting a radius or circle. Don't turn too sharp.
16. To back out of a cut, turn off the saw. Slowly and gently move the board to get it off of the blade.
17. Be cautious when gently blowing sawdust away so that you can see the line of cut.
18. Remove scrap pieces from table only once the blade has stopped.



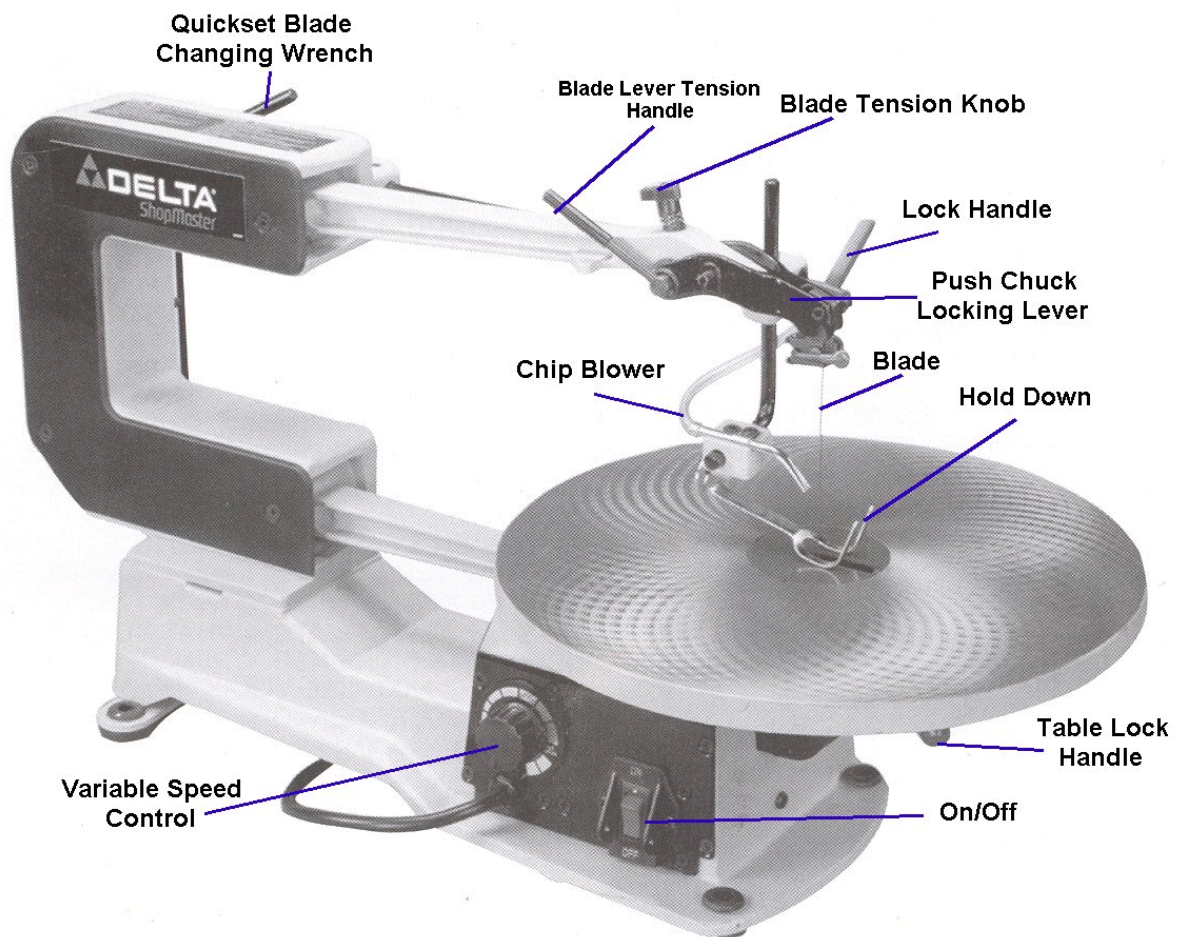
# Student Handout



## Scroll Saw

### Pre-Use Activities

- Thoroughly review and understand information provided in the scroll saw operator's manual with particular attention given to descriptions of safety procedures.
- Before using, always inspect the scroll saw for damage or disrepair. In addition, assure the blade teeth are pointing down and saw blade is undamaged, sharp, and properly secured in a vertical position. Inspect the electrical cord and plug for defects.
- If the scroll saw fails your inspection, inform your group leader, parent, or guardian and remove it from use until it can be repaired.



Continued ...



## Scroll Saw

### Operating Precautions

- Always wear a face shield or safety glasses when using a band saw. As appropriate, wear a dust mask and/or suitable hearing protection.
- Make sure guards are in place.
- Never wear gloves, a tie, loose clothing, a watch, rings, or jewelry when using a scroll saw. Tie long hair back or secure under a cap.
- Prior to starting, assure the blade guard is in place, belt guard is closed and tight.
- Always use the correct saw blade for the cutting task. Use a narrow blade for curving cuts.
- Adjust the hold-down to the thickness of the wood to be cut. Only cut wood with a flat bottom surface.
- Select the correct machine speed for the type of scroll sawing task to be performed.
- Keep your fingers to the side of the saw blade. Never allow your fingers to be in front of the saw blade.
- Your fingers must be positioned more than two inches from the blade when the saw is operating.
- When cutting cylindrical (round) stock, secure stock in a "V" fixture.
- Always turn the power source off and wait for the saw to stop before making scroll saw adjustments.
- Use a stick of brush to clear away wood scraps from the saw blade. Never use your fingers.
- Step away immediately if the saw blade breaks or comes loose. Turn off the power without endangering yourself.
- If you are injured by a scroll saw, notify your instructor immediately



# Observational Checklist



## Scroll Saw

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. long hair tied back.		
2. Safety glasses worn.		
3. Machine tables are clear of tools, stock, and debris. The area around the machine is clear.		
4. Fingers are at least 10cm away from the blade while cutting		
5. When making curved cuts, the work is rotated while being advanced into the blade. The radius of the curve is appropriate for the blade. Relief cuts are used for tighter curves. The blade is not "backed out" of curved cuts.		
6. Operates the saw from the front never from the side		
7. Feed speed is appropriate.		
8. When finished, the machine is shut off, the guide post lowered, and the table and surrounding area are cleared of offcuts.		

# Safety Quiz

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## Scroll Saw

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Wear \_\_\_\_\_ glasses or a face shield.
2. Allow \_\_\_\_\_ for the work piece.
3. Ensure the correct \_\_\_\_\_ is being used for the material being cut.
4. Never \_\_\_\_\_ the work into the blade.
5. Keep your fingers out of the \_\_\_\_\_ of the blade.
6. Never \_\_\_\_\_ or force a jammed piece through the equipment. Shut the \_\_\_\_\_ off and dislodge the piece.

### WORD BANK:

machine, safety, pull, clearance, path, blade, force

# Student Safety Passport



## Scroll Saw

### General Conditions

Students must be trained on the safe and proper use of a **Scroll Saw** before they may begin using it. The student must demonstrate to the teacher, proficiency and the safe work procedures that must be followed before usage.

### Personal Protective Equipment

Safety Glasses

Dust Masks

Coveralls

Hair nets [long hair]

### Possible Risk Factor

Small Projectiles

Fine wood dust

Minor cuts and abrasions

Entanglement of Hair and clothing

- ✓ The student has been trained on this equipment.
- ✓ The student understands the required personal protective equipment to operate this equipment.
- ✓ The student is aware of the possible risk factors

This is to certify that:

\_\_\_\_\_ **(print student name here)**

has been properly trained in the operation of a **Scroll Saw**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Scroll Saw

**OBTAIN “STUDENT SAFETY PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**GUARDS SHOULD BE INPLACE AND USED AT ALL TIMES.**

**CHECK BLADE TO MAKE SURE IT IS FIRMLY IN PLACE AND BLADE TENSION LEVER IS ADJUSTED CORRECTLY**

**KEEP WORK AREA CLEAR OF SLI//TRIP HAZARDS**

**HOLD MATERIAL FIRMLY AGAINST TABLE AND KEEP FINGERS AWAY FROM THE BLADE.**

**NEVER START THE MACHINE WITH STOCK AGAINST THE BLADE.**

# Table Saw



- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate. No loose clothing. Long hair must be tied back and jewelry is not allowed in the shop.
- Do not operate the table saw without the instructor's permission. Follow the
- Manufacturer's instructions for changing tool accessories.
- Be aware of the position of the on/off switches and emergency **STOP** button.
- Make sure the floor is clear in the work area.
- Check the blade for flaws (replace if damaged, worn, or dull) Make sure auto kick-back is in place. Secure the fence position before beginning. Always keep the work firmly down on the table while pushing it past the blade.
- Always "lock-out" the table saw before changing blades.
- Never reach over the blade.
- Always use a push stick when the fence is set under 3" to the blade.
- Ask for assistance when working with large pieces.
- Wear a dust mask when cutting treated wood or when there is a fine dust hazard.
- Stand clear of possible kickback. Keep your hands clear of the blade path.
- When working with a partner ensure you have clear communication. The second person should stand behind and to the left of the blade.
- Do not feed the material faster than the saw will accept.
- Use a fence when making a rip cut and a mitre gauge to make cross-cuts. Never cut a piece of material free-hand. Keep the work against the fence throughout the operation.
- Report all unguarded and inadequately guarded equipment promptly to your instructor.
- Always check the machine guards to make sure they are in place and operating, before using the machine.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



## The Table Saw

### Purpose:

To rip; to crosscut; to cut grooves or dadoes using a dado head to cut rabbets using a dado head or by intersecting cuts; to mould pieces using a moulding head; to cut chamfers, bevels, mitres.

**Key Words:** rip, crosscut, rabbet, dado, chamfer, bevels, grooving, mitres, rough ripping, mitre gauge, splitter, double fence, kickback, trapped offcut

**Safety:** *The following are in addition to the General Safety Rules.*

1. Secure instructor's approval.
2. Wear safety glasses.
3. Ensure blade cover and splitter are in place. (The splitter must be removed for certain operations - always consult the instructor before removing the splitter.)
4. Safety guarding must be in place covering the saw blade.
5. Dust collector must be operating and is properly connected to remove dust.
6. All stock must have at least one straight edge which runs against the fence or is held against the mitre gauge and one flat face which rests on the table.

**Do not rough cut on the table saw.**

7. Set blade height so that the bottom of the gullets are even with the top of the workpiece.
8. Always stand to the left side of the blade when ripping.
9. Rip cuts narrower than 6" require a push stick to propel the workpiece by the blade.
10. Ripping narrow boards requires a push stick for the left hand to keep the workpiece in contact with the fence. The left hand should remain 6": away from the blade. The push stick should not cause the blade to be pinched.
11. Stock to be ripped must have a minimum of 12" bearing against the fence.

**Continued ...**



## The Table Saw

### Safety:

12. Seek instructor's approval for boards to be ripped that are square or where the part bearing against the fence is less than the other major dimension:
13. Never reach over the blade (even if the blade cover is in place) to retrieve a just-ripped work piece. Shut off the saw and walk around.
14. Whenever the blade is angled (bevel cut), have the instructor approve the set-up.
15. Seek instructor approval for any special set-up; e.g. using a moulding head, special Jigs.
16. Know the meaning of trapped offcuts and how to avoid them.
17. Know the meaning of kickback and how to avoid it.

If excessive resistance to stock feeding is encountered or if the stock jams,

**STOP.**

Secure the work piece to the saw table and fence and shut the saw off.

### Techniques:

1. Good face up.
2. Moderate but steady feed rate.
3. Measure to the inside of the teeth when ripping.
4. Add 1/32" to ripped width to allow for the saw marks to be jointed off.

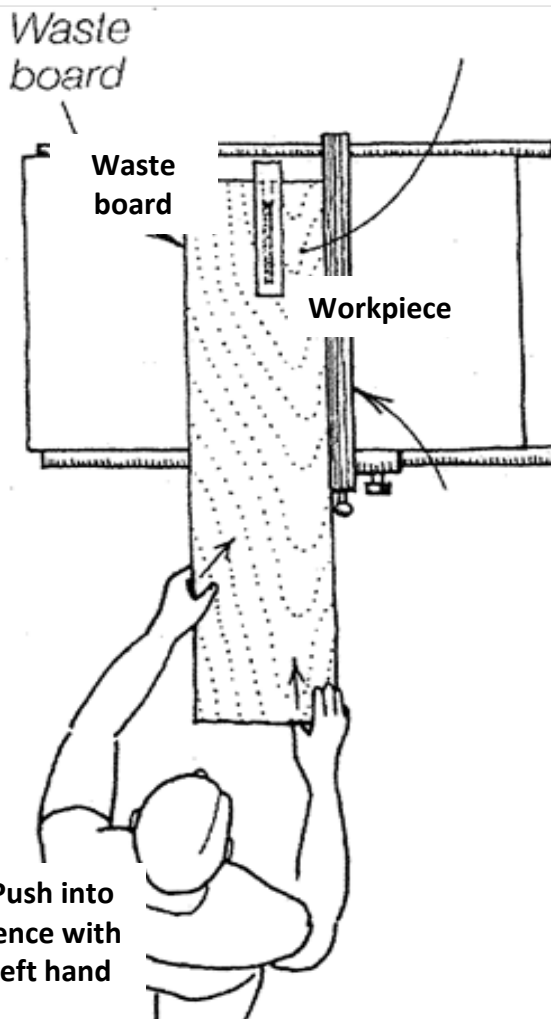
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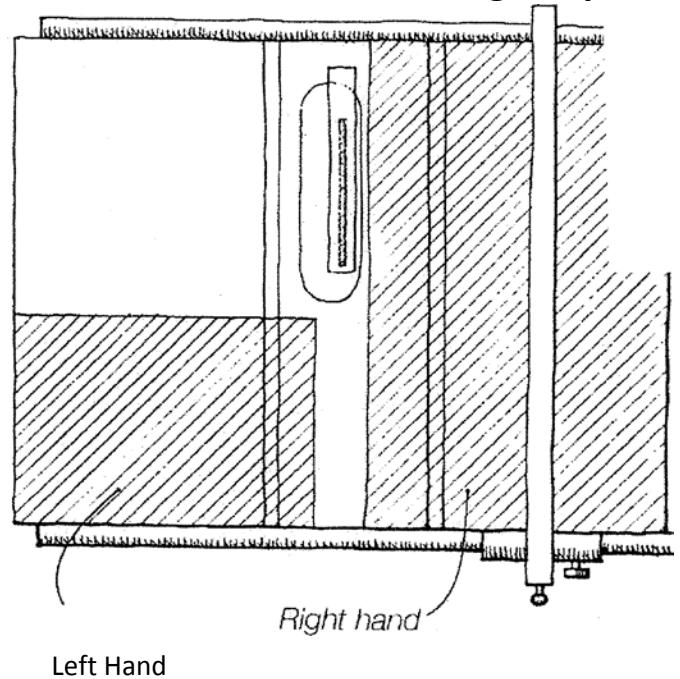
## The Table Saw

### Techniques for Ripping

Advance  
work  
forward with  
right hand



### Safe Hand Placement during a Rip Cut





# Student Handout

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## Table Saw

### What should you do before using a table saw?

A table saw can be dangerous if not used properly.

- Read the owner's manual carefully.
- Make sure you understand instructions before attempting to use any tool or machine.
- Learn the applications and limitations before use.

### What safety procedures should you follow when using a table saw?

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles).
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area.
- Wear protective footwear when required.
- Pay particular attention to the manufacturer's instructions on reducing the risk of kickback (when the wood can be violently thrown back toward the operator).
- Choose proper blades for the type of work being done.
- Keep blades clean, sharp, and properly set so that they will cut freely without having to force the work piece against the blade.
- Use the guards provided with the saw or ones designed for use with the saw that you are using. Keep them in place and in good working condition.
- Use a guard high enough to cover the part of the blade rising above the stock and wide enough to cover the blade when it is tilted. The blade height should be set so it does not extend more than about 3 mm (1/8 in) above the height of the piece being cut.
- Ensure that the fence is locked in position after the desired width has been set.
- Hold the work piece firmly down on the table and against the fence when pushing the wood through.

**Continued ...**



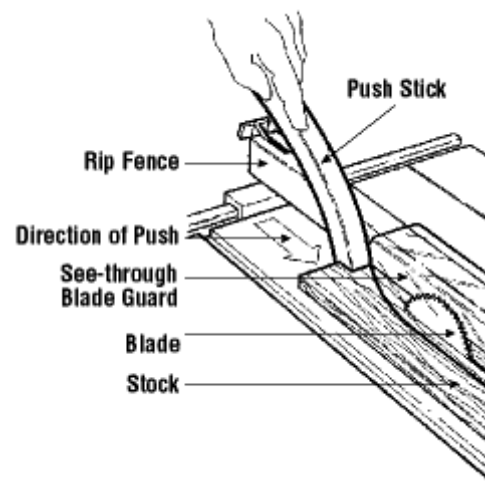
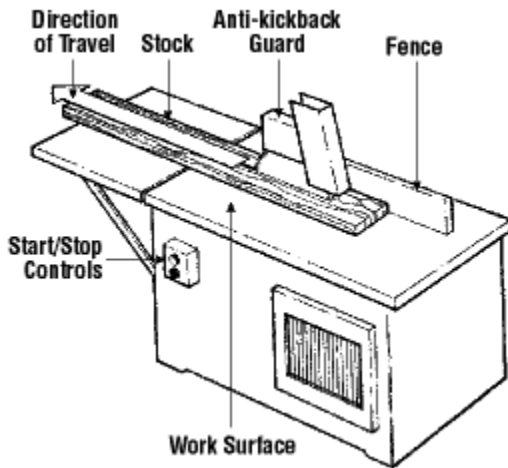
## Table Saw

- Ensure that there is adequate support to hold a work piece; use extension tables or roller supports at the side or back for larger pieces. If an assistant is at the back (outfeed) end of the saw, an extension table should be in place so the back edge is about 1.2 m (4 ft) from the saw blade. The assistant should wait for the work piece to reach the edge of the extension table and should not reach toward the saw blade.
- Feed stock into the blade against the direction of its rotation. Move the rip fence out of the way when cross cutting. Never use it as a cut off gauge. Use a push stick when ripping narrow or short stock (e.g., when the fence is set less than about 15 cm (6 in) from the blade; when the piece is less than 30 cm (12 in) long or when the last 30 cm (12 in) of a longer piece is being cut). Refer to ripping applications in the manufacturer's instruction manual..
- Use the push stick to remove the cut piece from between the fence and the blade.
- Keep hands out of the line of a saw blade.
- Use guard with a spreader (riving knife) and anti-kickback fingers for all ripping or cross cutting operations.
- Keep the body and face to one side of the saw blade out of the line of a possible kickback.
- Provide adequate support to the rear and sides of a saw table for wide or long stock.
- Be careful when waxing, cleaning, or servicing the table. Shut off and unplug (or lock out) a saw before doing any work on the saw.
- Keep area clean and clutter-free. Operate machines in a non-congested, well-lit area.
- Use the proper sawdust exhaust systems as required by operation.

**Continued ...**



## Table Saw



### What should you avoid when working with a table saw?

Do not saw freehand. Always hold the stock firmly against the mitre gauge or a rip fence to position and guide the cut.

- Do not reach around and over moving blades.
- Do not feed the work piece faster than the saw can accept.
- Do not leave a saw running unattended. Turn off the power and make sure the machine has stopped running before leaving the area.

# Observational Checklist



## Table Saw Operation

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety glasses worn.		
3. Push sticks obtained before machine is started. Guards in place.		
4. Machine tables are clear of tools, stock and debris. The area around the machine is clear.		
5. Blade is set to correct height.		
6. Fence is set to correct rip measurement.		
7. Operator is positioned to the left of the blade.		
8. Stock positioned correctly on the table. Hand placement is correct.		
9. Push sticks are used appropriately.		
10. Saw is shut off, ripped piece is recovered by walking around the saw.		

# Safety Quiz



## Table Saw

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Wear \_\_\_\_\_ goggles or a face shield.
2. Secure \_\_\_\_\_ position before beginning cutting procedures.
3. Check the \_\_\_\_\_ of the blade.
4. Check \_\_\_\_\_ clearance and adjust accordingly.
5. Use a \_\_\_\_\_ stick.
6. Get \_\_\_\_\_ when working on large pieces.
7. Wear a \_\_\_\_\_ mask when cutting treated wood.
8. Stand \_\_\_\_\_ of the path of a kickback.
9. Remove \_\_\_\_\_ and tie back \_\_\_\_\_ hair.
10. Never use the \_\_\_\_\_ when crosscutting.
11. Use a \_\_\_\_\_ gauge when crosscutting.
12. Never cut \_\_\_\_\_.

### WORD BANK:

freehand, safety, mitre, fence, fence, condition, jewelry, long, guard, assistance, push, dust, clear

# Student Safety Passport



## Table Saw

### General Conditions

Students must be trained on the safe and proper use of **Table Saws** before they may begin using it. The student must demonstrate to the teacher proficiency and the safe work procedures, which must be followed before usage. **All guards** must be in place and **ventilation system** must be free and clear. **Anti-kickback** devices must be in place and used. **Push sticks** must be used.

### Personal Protective Equipment

Safety Glasses  
Safety footwear  
Dust Masks  
Hearing Protection

### Possible Risk Factor

Small projectiles [wood chips]  
Slips and falls [wood dust]  
Contact with moving blade  
Eye injuries  
Abrasions [wood splinters]  
Hearing loss [High noise area] [unprotected ears]  
Entanglement of clothing or long hair  
Serious hand injuries  
Wood trapping between blade and fence

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of **Table Saw**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES

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## Table Saw

**OBTAIN “STUDENT SAFETY PASS”**

**ALWAYS USE A FENCE FOR SUPPORT WHILE CUTTING.**

**KEEP HANDS CLEAR OF BLADE PATH.**

**BEFORE STARTING THE SAW CHECK BLADE FOR CHIPS AND TIGHTNESS.**

**MAKE SURE GUARDS ARE IN PLACE AND WORKING PROPERLY.**

**CHECK BLADE HEIGHT.**

**CHECK FENCE TO ENSURE IT IS SET PROPERLY AND TIGHT.**

# Thickness Planer



- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, hearing protection, gloves and proper clothing as appropriate. No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate the Thickness Planer without the instructor's permission.
- Be aware of the position of the **ON/OFF** switches and emergency **STOP** button.
- Check the cutter head to make sure it is in good working order. Make all adjustments with the planer turned off, and locked out where the blade could be touched.
- Check for foreign objects. Never plane stock containing loose or unsound knots.
- When guards are supplied, they must be installed and working properly. Adjust the cutting depth to 1/16" (inch) less than the thickest part of the stock. Ask for assistance when working with large pieces.
- Wear a dust mask when cutting treated wood or when there is a fine dust hazard.
- While kickback is limited on this machine, it is still possible. Stand clear.
- Gently feed stock into the infeed rollers and allow the outfeed rollers to push stock through. Keep hands clear of the infeed and outfeed openings.
- The length of the stock to be planed is governed by the distance between the infeed and outfeed rollers, but should be at least 30cm (12") long.
- Turn the planer off immediately if it does not sound right.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



# Machine Review Sheet

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## The Thickness Planer

### Purpose:

1. To produce smooth, straight, flat faces and edges.
2. To produce edges which form a specific angle to a face.

**Key Words:** face, edge, end grain, in-feed/ out-feed tables, fence

**Safety:** *The following are in addition to the General Safety Rules.*

1. Obtain instructor's approval to use the planer.
2. Wear safety glasses and hearing protection. Secure loose clothing; remove jewelry. Secure long hair.
3. Make adjustments to the table before turning on the machine.
4. Do not adjust the in-feed or out-feed tables without permission.
5. Maintain a 3" margin of safety between the cutter and your hands. Beware of trailing fingers.
6. Do not plane the face of material thinner than 1/2".
7. Do not perform planing operations on any material less than 12" long. Cut longer boards to a manageable size.
8. Use only new stock free of bad twists, splits, and loose (black) knots. Inspect stock for staples and imbedded debris.
10. Do not plane manmade material (e.g. plywood, particle board).

### Techniques:

1. Always check the fence for the correct angle.
2. The depth of cut is 1/32".
3. The quality of finish is determined in large part by the number of knife marks per inch. The disadvantages of the revolving cutter head is that the machined surfaces left are not true planes, but consist of a series of waves. These waves are called knife marks. By varying the feed rate, the number of knife marks per inch can be altered. Strive for 12-14 knife marks per inch. A greater number of knife marks results in a burnished surface (sometimes called mill glaze), unsuitable for gluing or finishing.



## Thickness Planer

### General Safety Practices:

- Wear eye and hearing protection at all times.
- Do not operate machine without permission from the instructor.
- Make sure knives are sharp and properly adjusted.
- Make all adjustments before turning the machine on.
- Keep floor and work area free of chips, wood scraps and other materials.
- Make sure motor is at full RPM before feeding material into machine.
- Always stand to one side when feeding or receiving stock.
- Never attempt to remove more than 1/16" on softwood or 1/32" on hardwood during each pass.
- Do not place hands near feed rolls or knives.
- If stock gets stuck shut machine off, lower the table bed and remove the stock.
- Remove loose knots, nails or other defects before planing.
- Do not plane stock shorter than 12 inches.
- Do not plane stock to a thickness of less than 3/8" of an inch without a backer board.
- Never talk to fellow workers while operating the machine.
- Do not wear loose fitting clothes.
- If board is wet, lubricate the bed with kerosene or wax.

### Safe Operational Procedures:

- The planer/surfacer is designed to machine stock to exact thickness. It is equipped with a cutterhead, generally containing three knives and it is similar to a jointer except it cues the stock from the top.
- The machine is sized by the width of the cutter head with common sizes being 12, 18 and 24 inches.

**Continued ...**



## Thickness Planer

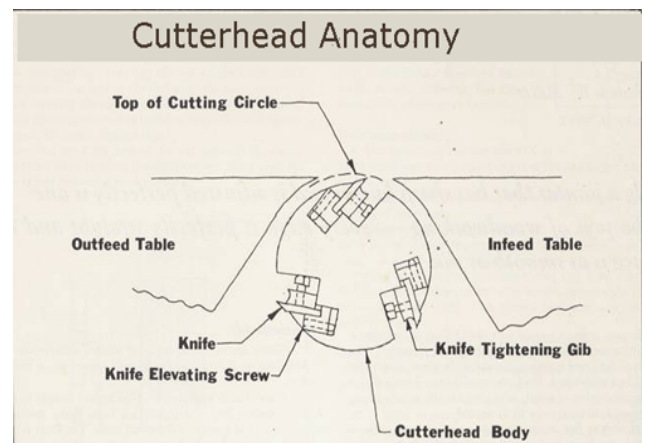
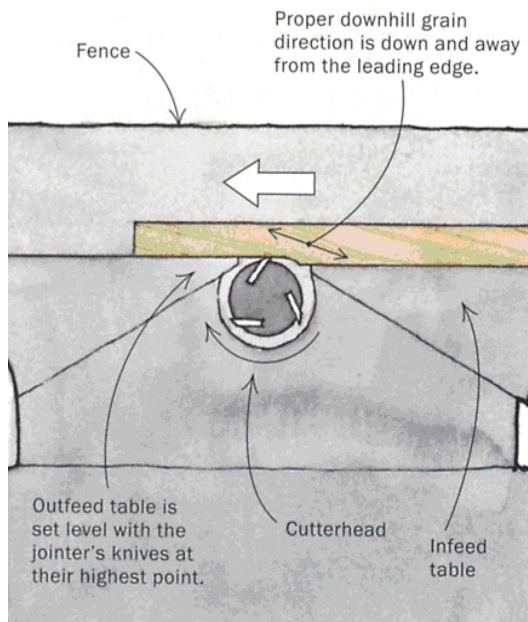
- It is equipped with four rollers, two upper and two lower rollers. The upper rolls consist of the infeed roll, which is milled or corrugated to feed the stock into the machine and the outfeed roller to pull the stock through the machine.
- The chip breakers located near the cutterhead on the infeed side keep the knives from chipping the board as they cut into the stock. The pressure bar, located near the head on the outfeed side, keeps the stock down against the table to get an even and uniform finished surface.
- The depth of cut is determined by the location of the lower table bed in respect to the cutterhead based on the starting thickness of the stock.
- To plane a board to exact thickness, first determine the desired thickness and starting thickness. Measure the board at its thickest point.
- Set the planer-surfacer for the thickness of the board less the depth of cut. The recommended depth of cut for one pass is no more than 1/16" for hardwoods and no more than 1/8" for softwoods.
- Position the stock so the knives will cut with the grain with the first or true surface being down. Never plane or surface painted or varnished stock or material containing nails or other foreign material.
- Adjust the feed roll speed. The speed range is commonly 15 to 45 feet per minute. Softwoods may run at the upper end of the range while hardwoods should be range at the lower end of the range.
- Turn on the machine and allow the motor to gain full speed.
- Feed the stock in at right angles to the cutterhead.
- Do not force the material through the machine but allow the feed roll to pull the stock through the machine.
- If planing long material get assistance from a helper or use support stand.
- Be sure to stand to one side of the machine and never allow hands to get close to the feed rolls or knives.

**Continued ...**



## Thickness Planer

- Run the stock through as many times as necessary to reduce to the desired thickness. Successive cuts should be taken off alternative faces. Remember the stock must be turned end for end so that planing will always be with the grain.
- Pieces shorter than 12 inches should never be surfaced or planed.
- Never plane or surface a board to less than 3/8" thick without the use of a [backer board](#) thicker and wider than the stock being planed.
- Shut off machine and do not leave area until the machine has completely stopped.



The cutterhead on both the jointer and the planer removes short, arc-shaped lengths of wood from the workpiece. Consequently, close examination of machine jointed and machine planed surfaces reveals a slightly rippled surface, a series of minute hollows and ridges.

# Observational Checklist



## Thickness Planer Operation

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety glasses and hearing protection worn.		
3. Machine tables are clear of tools, stock, etc.		
4. The area around the machine is clear.		
5. All adjustments made before turning the machine on.		
6. Minimum stock sizes are respected.		
7. Stock is inspected for loose dirt, debris, and staples.		
8. Most stable face/edge is placed down on the table.		
9. Machine is turned on and allowed to come to full speed.		
10. Always stands to one side of the machine and never allows hands to get close to the feed rolls or knives.		
11. Respects the material's minimum dimensions during planning.		
12. Keeps hands clear of the infeed and outfeed openings.		
13. When finished, the machine is turned off and resultant debris cleaned up.		



## Thickness Planer

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Check the floor for any \_\_\_\_\_.
2. Replace \_\_\_\_\_ when worn or dull.
3. Make adjustments only when the \_\_\_\_\_ is off and the off switch is \_\_\_\_\_.
4. Check hood and make sure the \_\_\_\_\_ is on.
5. Use a \_\_\_\_\_ stick when necessary.
6. Wear a dust \_\_\_\_\_ where planing treated wood.
7. Assume a position with your body \_\_\_\_\_ of a possible kickback.
8. Remove all \_\_\_\_\_ and tie back \_\_\_\_\_ hair.
9. Before investigating any jammed pieces \_\_\_\_\_ the power off and \_\_\_\_\_ it out.

### WORD BANK:

shut, lock, mask, blades, clear, vacuum, push, power, locked, debris, jewelry, long

Continued ...



## Thickness Planer

### Short Answer Questions

1. What should you do if your board gets stuck while planing?

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2. What are the minimal dimensions that can go through the planer without a backer board?

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3. Explain how to use a backer board?

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4. What is the thickness planer designed for?

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5. What should be done in order to ensure an even cut all the way through?(no planer snipe at the beginning or end of your piece) \_\_\_\_\_

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# Student Safety Passport



## Thickness Planer

### General Conditions

Students must be trained on the safe and proper use of a **Thickness Planer** before they may begin using it. The student must demonstrate the ability to use the equipment safely and proficiently. **All guards** and **safety devices** must be in place and **ventilation system** must be free and clear.

### Personal Protective Equipment

- Safety Glasses
- Breathing Protection
- Safety footwear
- Hearing Protection

### Possible Risk Factor

- Small and large projectiles [wood chips]
- Slips and falls [wood dust]
- Contact with moving blades
- Eye injuries
- Hearing loss [unprotected ears]
- Serious hand injuries [Improper placement of hands]
- Entanglement of clothing or hair

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of a **Thickness Planer**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_



# OPERATING PROCEDURES

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## Thickness Planer

**OBTAIN “STUDENT SAFETY PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**12” IS MINIMUM LENGTH OF STOCK**

**1/16” MAXIMUM DEPTH OF CUT**

**ALWAYS WEAR CSA APPROVED SAFETY  
GLASSES AND HEARING PROTECTION**

**FEED ONLY ONE PIECE AT A TIME**

# Wood Jointer

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- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, hearing protection, and proper clothing as appropriate. No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate the wood jointer without the instructor's permission.
- Be aware of the position of the **ON/OFF** switches and emergency **STOP** button.
- Check the cutter head to make sure it is in good working order. Make all adjustments with the jointer turned off, and locked out where the blade could be touched.
- Before investigating any jammed pieces shut the power off and lock it out.
- Check for foreign objects. Never joint stock containing loose or unsound knots.
- Ensure the guard is installed and working properly. Adjust the fence to slightly larger than material size. Set cutting depth to 3mm (1/8 in.) or less. Never make "free hand" cuts on the jointer. Always use the fence. Ask for assistance when working with large pieces.
- Wear a dust mask when cutting treated wood or when there is a fine dust hazard.
- Stand clear of possible kickback. Verify a firm footing when operating the jointer.
- Never reach directly over the moving blade to remove stock. Use a push stick for thin work. Never let a finger come within 8cm (3") of blade when running. Always push the work well beyond the blade when finishing a cut. Never let go of the stock during the cut.
- Make sure stock is at least 35.5cm (14") long. Make sure stock is no narrower than 25.4mm (1") when edge jointing and 12.7mm (1/2") when face jointing.
- Turn the jointer off immediately if it does not sound right or if slivers of wood catch between the blade and table.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



## The Jointer

### Purpose:

1. To produce smooth, straight, flat faces and edges.
2. To produce edges which form a specific angle to a face.

**Key Words:** face, edge, end grain, in-feed/ out-feed tables, fence

**Safety:** *The following are in addition to the General Safety Rules.*

1. Obtain instructor's approval to use the jointer.
2. Wear safety glasses. Secure loose clothing; remove jewelry. Secure long hair.
3. Make adjustments to the fence before turning on the machine.
4. Do not adjust the in-feed or out-feed tables without permission.
5. Maintain a 3" margin of safety between the cutter and your hands. Beware of trailing fingers.
6. Do not joint the edges of material narrower than 1". For stock between 1" and 4", use push stick and feather board.
7. Do not joint (surface) the face of material thinner than 1/2".
8. Do not perform jointing operations on any material less than 14" long. Cut longer boards to a manageable size.
9. Use only new stock free of bad twists, splits, and loose (black) knots. Inspect stock for staples and imbedded debris.
10. Do not joint end grain or manmade material (e.g. plywood, particle board).
11. Use a two-handed push block when jointing a face (surfacing).
12. Place the most stable (usually concave) side of board down.

### Techniques

1. Always check the fence for the correct angle.
2. The depth of cut is 1.5mm (1/16").

**Continued ...**



## The Jointer

### Techniques continued

3. The quality of finish is determined in large part by the number of knife marks per inch. The disadvantages of the revolving cutter head is that the machined surfaces left are not true planes, but consist of a series of waves. These waves are called knife marks. By varying the feed rate, the number of knife marks per inch can be altered. Strive for 12-14 knife marks per inch. A greater number of knife marks results in a burnished surface (sometimes called mill glaze), unsuitable for gluing or finishing.
4. The cutterhead on both the jointer and the planer removes short, arc-shaped lengths of wood from the workpiece. Consequently, close examination of machine jointed and machine planed surfaces reveals a slightly rippled surface, a series of minute hollows and ridges.



## What should you do before using jointers and planers?

Jointers and planers can be dangerous if not used properly.

- Read the owner's manual carefully.
- Make sure you understand instructions before attempting to use any tool or machine.
- Learn the applications and limitations before use.

## What should you check before starting your machine?

- Are the knives set for the proper clearance and depth of cut? Are they sharp, balanced, and fastened securely?
- Is the fence anchored in the proper position?
- Can the guard (swing or overhead) move freely and return over the cutting head?
- Is the equipment properly lubricated?
- Are the parts or accessories in proper working condition?

## What safety procedures should you follow when using jointers and planers?

- Wear safety glasses or goggles, or a face shield (with safety glasses or goggles).
- Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area.
- Wear protective footwear when required.
- Allow only experienced and trained personnel to operate jointers and planers.
- Use only sharp, balanced and joined knives.
- Replace old square cutting heads with round heads as they are much safer.
- Ensure start and stop buttons are within easy and convenient reach of the operator.
- Make sure the swing guard pushes beside the stock as it passes over the cutting heads and returns against the fence after the stock is removed.
- Remove all wrenches and tools used in the set up from the table.

**Continued ...**



- Provide a minimum clearance of at least 1 m (3 ft.) greater than the length of the longest stock being worked.
- Construct hold-down push blocks to do beveling and surface operations.
- Use hold-down (double-handed) push blocks. These keep hands well away from the cutting head.
- Maintain an adequate amount of downward and forward force with push blocks as the knife blades on a revolving cutting head can take the stock from an operator's hands.

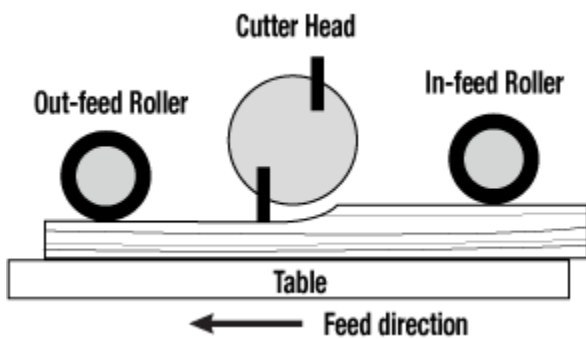


Figure 1 – Planer

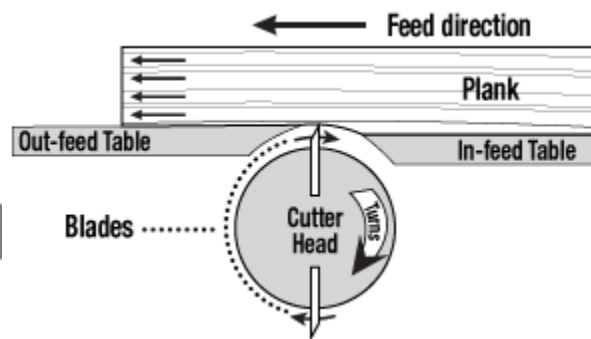


Figure 2 - Jointer

## What should you avoid when using a jointer or planer?

- Do not leave the machine running unattended. Shut off the power and make sure that the cutting head has stopped revolving.
- Do not make cuts deeper than 1.5 mm (1/16") in one pass.
- Do not joint (edge) stock of pieces less than 30 cm (12") long, 2 cm (3/4") wide and less than .6 cm (1/4") thick.
- Do not surface stock less than 30 cm (14") long, 2 cm (3/4") wide or more than 15 cm (6") wide or less than 1.5 cm (5/8") thick.
- Do not pass hands over the cutters.
- Do not remove dust or particles of wood from a table by hand or with compressed air. Use a stick or brush.

# Observational Checklist



## Wood Jointer Operation

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

	YES	NO
1. Loose clothes and jewelry removed or secured. Long hair tied back.		
2. Safety glasses worn.		
3. Push block/push stick obtained before machine is started.		
4. Machine tables are clear of tools, stock, etc.		
5. The area around the machine is clear.		
6. Fence is checked and adjusted if required before machine is turned on.		
7. Minimum stock sizes are respected.		
8. Stock is inspected for loose dirt, debris, and staples.		
9. Most stable face/edge is placed down on the table.		
10. Machine is turned on and allowed to come to full speed.		
11. The feed speed is appropriate.		
12. The push block is used correctly when jointing a face. The stock is pushed firmly against the fence when jointing an edge,.		
13. The 3" safety margin is respected when jointing an edge. When required, a push stick and featherboard are used.		
14. When finished, the machine is turned off, and the push block/push stick is returned to its holder.		

# Safety Quiz



## Wood Jointer

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Wear \_\_\_\_\_ goggles or a face shield.
2. Secure the \_\_\_\_\_ position before beginning cutting procedures.
3. Check the \_\_\_\_\_ of the blade. Set it at one-eighth of an inch or less.
4. Check the \_\_\_\_\_. Make sure it returns to cover the blades.
5. Use a \_\_\_\_\_ stick .
6. Get \_\_\_\_\_ when working on large pieces .
7. Wear a \_\_\_\_\_ mask when cutting treated wood .Put the vacuum on.
8. Stand \_\_\_\_\_ of the path of a kickback.
9. Remove \_\_\_\_\_ and tie back \_\_\_\_\_ hair.

**WORD BANK:** safety, fence, depth, jewellery, long, guard, assistance, push, dust, clear

1. Give two reasons why jointing end grain is a problem?

- a) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- b) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



# Student Safety Passport



## Wood Jointer

### General Conditions

Students must be trained on the safe and proper use of a **Wood Jointer** before they may begin using it. The student must demonstrate the ability to use the equipment safely and proficiently. **All guards** and **safety devices** must be in place and **ventilation system** must be free and clear. **Push sticks** must be used.

### Personal Protective Equipment

- Safety Glasses
- Breathing Protection
- Safety footwear
- Hearing Protection

### Possible Risk Factor

- Small and large projectiles [wood chips]
- Slips and falls [wood dust]
- Contact with moving blades
- Eye injuries
- Hearing loss [unprotected ears]
- Serious hand injuries [Improper placement of hands]
- Entanglement of clothing or hair

This is to certify that:

\_\_\_\_\_ (print student name here)

has been properly trained in the operation of a **Wood Jointer**, understands the possible risk factors and the required personal protective equipment to be worn.

Student signature: \_\_\_\_\_

Teacher signature: \_\_\_\_\_

Date of training: \_\_\_\_\_

# OPERATING PROCEDURES



## Wood Jointer/Planer

**OBTAIN "STUDENT TECH PASS"**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

### **BEWARE OF KICK BACK**

Stock being jointed can be propelled violently back at the operator. Kickback is caused by:

1. Exceeding recommended depth cut.
2. Tipping stock into blades. Never violate 14" (355 mm) rule.
3. Dull cutter.

***WHEN USING THE JOINTER:***  
**14" (inches) minimum length**

***WHEN PLANING THE FACE:***  
**1/2" (inch) minimum thickness**

***WHEN JOINTING AN EDGE:***  
**1 1/2" (inch) minimum width**

**3/4" – 2" push stick with featherboard**

# Wood Lathe

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Lathes are great to work with, you can create so many things, table legs, baseball bats, staircase rungs, just to name a few. But it can be a dangerous tool if you are inexperienced, not trained properly, or careless. You can be hurt severely or even killed. Proper safety training is very important.

The wood rotates between the headstock and tailstock to permit carving. Rotating speeds range from 200 to 4,000 rpm. The following are safety guidelines for safe operations of wood lathes. Read these and know them well.

- Operators should carefully inspect all parts of the lathe for defects before beginning operations. Strictly adhere to the rules for correct handling of woodturning tools and hand position on the lathe's tool rest. Make sure to follow the guidelines on turning speeds, especially for roughing operations.
- Select stock carefully and inspect it closely before undertaking a project. Avoid using wood with knots or splits.
- Be sure to allow laminated, or glued-up, blanks to dry thoroughly before turning.
- Make certain that the work is secure before you start turning operations. Frequently check the secureness as you continue working on the wood. Position the tool rest no more than 1/8 of an inch from the stock. After adjusting the chuck, remove the chuck wrench immediately. Make sure all the guards are in place around the rotating heads of the lathe before operations begin.
- Before turning on the power to the lathe, rotate the stock by hand to be sure that it clears the tool rest. Never adjust the position of the tool rest while the lathe is running. Always remove the toolsets from the lathe's bed when sanding.
- Keep the woodturning tools (roughing-out gouge, round-nose scraper, square-nose scraper, skew chisel, spindle gouge, bowl gouge, parting tool, spiral tool), sharp. A dull chisel requires that you apply excessive feed pressure. Grip the tool being used firmly. Hold the tool's handle in your right hand and support the tool's leading end with your left hand. Prop the tool on the tips of your fingers and grasp the side or top of the blade with your thumb. The index finger should rest comfortably along the ledge of the tool rest.

**Continued ...**



- When performing a cut parallel to the work, move both your hands and the tool together, using the index finger of your left hand as a depth gauge. Always be sure to feed a woodturning tool slowly and steadily. Never jam the tool's blade or otherwise force it into the work.
- Do not move the tool with your arm. Shift your weight back and forth and arch and straighten your back. Using your legs and back to move the tool allows long, flowing, and uninterrupted cuts. Make contact with the work cautiously, and then slowly progress more aggressively. Avoid the extremes of overdoing an operation and just rubbing against the stock. Keep the woodturning tools beside or behind you so there is no need to reach over the lathe to get them.
- Never use your fingers to check the work for roundness while the lathe is running, especially during roughing operations. Stop the lathe to check the progress, or rest the blade of the tool lightly against the work as it turns.
- Do not use a dead center on the tailstock. A dead center, which does not turn, creates friction and may burn the work, damaging the product and creating potential hazards.
- Provide plenty of lighting for your work. Poor lighting and shadows can increase fatigue.
- Never leave the lathe running unattended. Keep the lathe unplugged when not in use and before making adjustments.
- Clean up wood shavings and sawdust often. Sawdust can create a fire hazard and an explosive atmosphere.
- Store a standard, well equipped first-aid kit in the shop where it is easily accessible.
- Never wear loose clothing or jewelry.
- Keep long sleeves rolled up and long hair tied back.
- Wear a dust mask when performing sanding operations.

**Continued ...**

# Wood Lathe

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- Always wear safety goggles or a face shield.
- Wear sturdy shoes or boots with non-slip soles.
- Wear ear plugs or ear muffs for hearing protection.

# Machine Review Sheet

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## Wood Lathe

### Purpose:

A machine for shaping a piece of material, such as wood, by rotating it rapidly along its axis while pressing a fixed cutting or abrading tool against it.

**Key Words:** Stock, chisels, turn, tool rest, guide

**Safety:** *The following are in addition to General Safety Rules.*

1. Wear safety glasses or goggles, or a face shield (with safety glasses or goggles) to protect yourself from flying chips.
2. Wear hearing protection that is suitable for the level and frequency of the noise you are exposed to in the woodworking area.
3. Wear a dusk mask when dust is generated (e.g., during sanding operations).
4. Wear protective footwear when required.
5. Work in well-lighted area.
6. Before the lathe is turned on, ensure that all clamps and fittings are secure and that the work piece is free to turn.
7. Use stock free of defects.
8. Hold tools firmly with both hands and against the tool rest.
9. Hold the stock securely on the faceplate or between the centres.
10. Use only furnished or approved tools.
11. Use sharp, well-maintained chisels and gouges.
12. Select a speed that is appropriate for the job. Operate the lathe at a low speed and use a moderate cut depth to prevent splinters from flying out during roughing operations. The actual speed of the lathe depends on type of wood, a diameter of stock, nature of work being done and type of tool used.

**Continued ...**

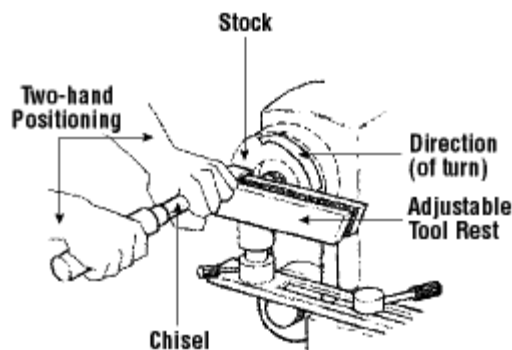
# Machine Review Sheet



## Wood Lathe

Adjust tool rests so that they are parallel and as close as possible to the stock. They should also be set high enough so that tools will cut into the wood slightly above the centre of the work being turned.

13. Remove the tool rest when sanding or polishing.
14. Use appropriate tools to hold the sand paper or emery paper whenever possible. Examples include a 'nut cracker' or the paper fixed to a piece of flat wood. If you must use your hands always hold the paper in a way that will not allow the paper to catch, pull or entangle around the stock.
15. To make a faceplate turning, the one hand steadies the tip of the chisel, which holds the edge against the tool rest while the other hand guides the tool. Keep the tip of the chisel held higher than the handle.



## What should you avoid when working with a wood turning lathe?

- Do not wear gloves, loose clothing, rings or jewelry around the neck that can hang outside one's clothing. Clothing should be comfortable but not so loose that it can catch on the machine or get entangled with any rotating parts or the wood being turned; shirts should be tucked in and long hair tied back.
- Do not leave a running lathe unattended - leave only after the lathe has been turned off and it has come to a complete stop.
- Do not use makeshift tools.
- Do not use stock containing checks, splits, cracks, or knots.

# Student Handout

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## Wood Lathe

- Wear Personal Protective Equipment (PPE) such as safety glasses, safety goggles, face shields, gloves and proper clothing as appropriate. No loose clothing, long hair or jewelry is allowed in the shop.
- Do not operate the wood lathe without the instructor's permission.
- Be aware of the position of the on/off switches and emergency **STOP** button.
- Make sure headstock, tailstock and tool rests are working properly and are tight before operating.
- Ensure your material is secure before starting motor.
- Ensure all chisels are sharp and without nicks. Show your instructor any problems with the tooling.
- Keep a firm but not too tight grip on the chisel. Do not strain your hand or arm, and take your time. Ease tool into material, take your time and listen for motor strain, or look for burning material. Ensure you have a good grip, particularly when you are approaching the headstock or tailstock.
- Wear a dust mask when working with treated wood or when there is a fine dust hazard.
- Stand clear of possible kickback. Be sure to have firm footing when operating the lathe.
- Do not attempt thin and long materials without proper setup. If in doubt, ask your instructor.
- Turn the lathe off immediately if it does not sound right or if there is excessive vibration.

***AT ALL TIMES – IF IN DOUBT, SEE YOUR INSTRUCTOR***



# Observational Checklist



## Wood Lathe

*Mastery is required.*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**YES      NO**

1. Loose clothes and jewelry removed or secured. Long hair is tied back.		
2. Safety glasses worn.		
3. Machine tables are clear of tools, stock, and debris.  The area around the machine is clear.		
4. Student makes certain that the work is secure before starting machine.		
5. Student positions the tool rest no more than 1/8 of an inch from the stock.		
6. Before turning on the power to the lathe, student rotates the stock by hand to be sure that it clears the tool rest		
7. Make sure all the guards are in place around the rotating heads of the lathe before operations begin.		
8. When finished, the machine is shut off, the guide post lowered, and the table and surrounding area are cleared of shavings.		

# Safety Quiz



## Wood Lathe

Name \_\_\_\_\_ Date: \_\_\_\_\_

1. Long \_\_\_\_\_ must be tied back before using any power tool. And \_\_\_\_\_ must be removed.
2. Any adjustments to a machine must be made with the power \_\_\_\_\_.
3. Always wear \_\_\_\_\_ glasses or a face shield.
4. Ensure all chisels are \_\_\_\_\_ and without \_\_\_\_\_.
5. Before turning on the power to the lathe, rotate the stock by \_\_\_\_\_ to be sure that it clears the tool rest.
6. Position the tool rest no more than \_\_\_\_\_ from the stock.
7. Be sure to allow laminated, or glued-up, blanks to \_\_\_\_\_ thoroughly before turning.
8. Avoid using \_\_\_\_\_ with knots or \_\_\_\_\_.

**WORD BANK:** splits, wood, dry, 1/8 of an inch, hand, nicks, sharp, CSA approved, off, hair, jewelry,

# Student Safety Passport



## Wood Lathe

### General Conditions

Students must be trained on the safe and proper use of the **Wood Lathe** before they may begin using it. The student must demonstrate the ability to use the equipment safely and proficiently.

### Personal Protective Equipment

Safety Glasses  
Appropriate Footwear  
Hair tied back and jewelry removed

### Possible Risk Factor

Eye injuries  
Hand Injuries  
Entanglement of clothing and hair  
Slipping  
Projectiles  
The student has been trained on this equipment.

The student is aware of the possible risk factors.

The student understands the required personal protective equipment to operate this equipment.

This is to certify that:

\_\_\_\_\_ **(print student name here)**

has been properly trained in the operation of **Belt and Disk Sanders**, understands the possible risk factors and the required personal protective equipment to be worn.

**Student signature** \_\_\_\_\_

**Teacher signature** \_\_\_\_\_

**Date of training** \_\_\_\_\_

# OPERATING PROCEDURES

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## Wood Lathe

**OBTAIN “STUDENT SAFETY PASS”**

**WEAR PERSONAL PROTECTIVE EQUIPMENT**

**ASK INSTRUCTOR IF SET UP IS CORRECT**

**SELECT SPEED THAT IS APPROPRIATE FOR  
THE JOB**

**DO NOT LEAVE MACHINE UNATTENDED WHILE  
RUNNING**

**DO NOT USE MATERIAL CONTAINING SPLITS,  
CRACKS OR KNOTS.**