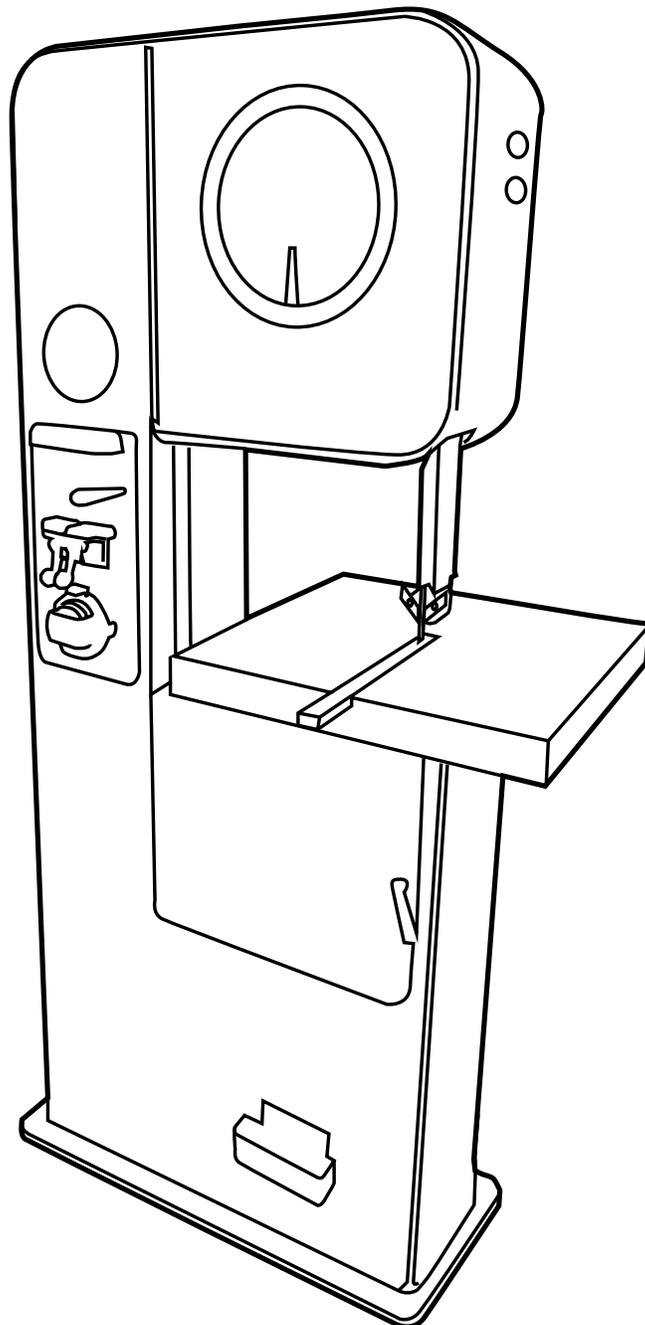


APROE

Advanced Prototype Engineering

Instructor Guide Example

DoAll Vertical Metal Bandsaw



Note:

This sample document is intended to be used as a guide by a trained instructor for teaching a hands-on class. The instructor uses the outline to ensure that each class is similar in content and clearly communicates safety, tool use and shop policy. Each section of the outline is short; the instructor relies on their experience to expand the listed topic. The core class is always the same, but the instructor has room to make improvisational changes to suit the specific needs and skill levels of the students.

Machine Introduction

Uses

- The DoAll vertical metal cutting bandsaw is used for cutting metal and plastic.
- The bandsaw is best for cutting curves.
 - It will make straight cuts, but there will almost always be a little variation in the line.
 - Cleanup with a sander or grinder is usually required for a smooth finished edge.

Materials

- Allowed
 - Most metals
 - Most plastics
- Not allowed
 - Wood
 - Hardened metals
 - Welded steel
 - Composites like carbon fiber and fiberglass

Scope of This Class

- This class is designed to teach basic safety and skills on the DoAll vertical metal cutting bandsaw. Most bandsaws of this style are similar but there are no standardized controls; each model may be different.
 - Before using a bandsaw or accessories not covered in this class, you must get proper training.
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Notes for Instructor:

Check in with students to ensure comprehension of the following:

- What the bandsaw is best used for, and not good for
- Allowed materials
- Banned materials

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Parts and Controls

Major Parts

- The *start button* starts the blade.
- The *stop button* shuts off power to the blade.
 - The blade takes a moment to stop.
- The *table* supports the material being cut.
 - Always keep material flat on the table.
- The *blade* is a continuous band of metal that wraps around the upper and lower wheels.
- The *upper blade guides* are a set of bushings used to guide the blade and limit side to side movement.
 - They should be vertically adjusted for each cut.
- The *blade guard* keeps hands away from the blade.
- The *lower blade guides* are similar to the upper guides, but are located below the table.
 - They should be adjusted only by Shop Staff.
- The *table insert* is a plate in the middle of the table that is removed for blade changes.
- A *push stick* is used on small pieces of material to keep fingers away from the blade.
- The *blade tension adjuster* raises and lowers the upper wheel to increase or reduce tension on the blade.
 - It should only be adjusted by shop staff.
- The *speed chart* shows the correct blade speed based on material being cut.
- The *speed display* shows the actual blade speed.
- The *speed adjuster* changes the blade speed.
 - It must be adjusted while the saw is running.

Note: Each item in *italic* would be explained and demonstrated by the instructor.

Note: Each page has a section to pause the instruction and check for comprehension of key points.

Notes for Instructor:

Check in with students to ensure comprehension of the following:

- Power switch location
- Push sticks
- Blade guard

Safety

Common Bandsaw Injuries

- Body parts in contact with the blade
 - Keep fingers away from the blade.
 - Use a push stick when needed.
 - Lower the upper blade guide and guard within $\frac{1}{4}$ " of your work.
- Flying debris
 - Always wear safety glasses.
- Entanglement
 - Avoid loose clothing and other dangling items.
 - Always wear short sleeves, pull hair back, remove jewelry and lanyards, etc.

Personal Protective Equipment (PPE)

- Required
 - Safety glasses
 - Short sleeves
 - No long hair, dangling lanyards, etc
 - Closed toe shoes
 - Recommended
 - Hearing protection
 - Dust mask/filter
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Notes for Instructor:

Check in with students to ensure comprehension of the following:

- Importance of push sticks
- Importance of the blade guide & guard
- Proper dress and PPE

Cutting

Blade Selection

The number of *teeth per inch* (TPI) of a blade will change how it cuts.

- More teeth will result in a slower, but smoother cut.
- Fewer teeth will leave a rougher edge, but cut faster.
- Shop policy requires a minimum of 3 teeth in the material being cut at all times.
- Contact Shop Staff for blade changes.

Note: This section teaches to a specific skill set, determined by the Shop Manager.

Calculating and Adjusting the Blade Speed

A blade moving at the correct speed will produce a better quality of cut and prolong blade life.

- Use the blade speed chart to determine the correct speed.
- The blade speed display shows the current speed.
- The saw must be running while changing speed.
- Turn the speed adjuster handle until the speed display shows the desired speed.

Straight Cuts

Every bandsaw has some amount of “drift”.

- While cutting straight into the blade, it may veer off to one side or the other.
- You may need to adjust the angle of your work to keep making a straight cut.

Curved Cuts

Every blade has a minimum cut radius depending on the blade width.

- The limiting factor on the radius is the back of the blade rubbing the material being cut.
- Forcing a blade to cut a small radius and rubbing will result in enough friction to burn the work, create smoke and make a terrible noise.
- Blade damage is a possibility.
- Make *relief cuts* to create a small radius; clean up the edge with a sander or file.

Notes for Instructor:

- Reinforce that the saw must be running to change the blade speed.
- Encourage students to adjust the blade speed for every cut.
- Demonstrate making relief cuts.
- Point out the *minimum radius chart* near the saw.

Hands On

Area and Machine Preparation

- Clean and clear the table.
- Make sure there is sufficient infeed and outfeed room.
- Check/set blade guide height.
 - The height of the blade guide should be about ¼" above the material.
- Have a push stick within easy reach.

Making the Cut

- Turn on the blade.
- Slowly push material into the blade.
 - Too slow of a feed rate will create excessive heat from friction.
 - Too fast will bog the motor and reduce cut quality.
- Always keep one hand or push stick on the material; never completely let go.
- Stay in control of the material until it is past the back of the blade.
- Turn off the blade and wait for it to stop moving.
- Do not clean off the table with your hand if the blade is still moving.
 - Wait for it to stop or use a piece of metal.

Notes for Instructor:

- Demonstrate a too-slow feed rate
 - Show the heat buildup on the material.
 - Show that the saw is not making chips.
- Demonstrate a too-fast feed rate.
 - Point out the sound to the saw motor and blade.
- Have each student demonstrate the minimum skill set (listed below).
- Use the after-class supervised practice session to work on specific problem areas, or to answer questions about advanced techniques.

Note: Students have seen each part of the saw demonstrated, and now will use the tool. They must demonstrate proficiency, safety and basic competency.

This class would last 30 to 45 minutes with 4 to 6 students.

Minimum Skills for Students to Demonstrate

- Set blade guide and guard to safe height.
 - Calculate the correct blade speed.
 - Adjust the blade speed.
 - Use a push stick to safely cut a small piece of material.
 - Use the bandsaw safely and competently.
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- There are 30 minutes of supervised practice after the class session. This time can be used to answer questions or to work individually with students who did not show competency.

Cleanup

- Wait for the blade to stop.
 - Lower the blade guard all the way down on the table.
 - Brush off the saw table and any other dirty parts of the saw.
 - Sweep or vacuum the floor around the saw and any other areas you used.
 - Put away all tools.
 - Learn the “trash, recycle or reusable scrap” policy for your shop, and follow it.
 - Check for plastic recycle options.
 - Pieces of metal larger than 6" x 12" should be cut square and placed on the shelf.
 - Put metal scrap into the steel or aluminum recycle can
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Notes for Instructor:

- Students must participate in cleaning.
- After cleaning, give the written tests.

Record Keeping

- Make sure that each student's name/ID is clearly written.
- Sign the form, unless they did not pass.
- Photograph or scan each document and email them to your APROE manager.
- Give the paper copy to the client's Shop Manager.

If a student did not pass, or you do not believe that he or she has the required skills, contact the client's Shop Manager and your APROE manager ASAP.

- An in-person discussion with the Shop Manager is preferred; follow up via email promptly.
- Explain why the student should not pass, and what specific skills need to be acquired.
- Include your APROE manager in the email.