

# UW Physics Student Machine Shop

## Standard Operating Procedures

### Vertical Bandsaw

#### Purpose

Like all saws, vertical band saws can generally remove materials much faster than mills, lathes, grinders, or other machine tools. The saw's highly efficient material removal is offset by its very limited ability to produce precise geometry, dimensions, and surface finishes. This tends to make sawing operations most helpful in the earliest stages of the job.

A vertical band blade is basically a long, thin, High Speed Steel loop with teeth directed downward and angled slightly outward. The pitch (spacing) and rake (angle) of these teeth are varied to accommodate different types of materials. Easily-machined materials like plastics, wood, and softer metals such as aluminum, are best cut with a coarser pitched blade utilizing a more aggressive cutting geometry that allows for rapid chip clearance. These coarse aggressive blades cut best through softer materials at higher RPM speeds. On the other hand, tougher materials like steel alloys, and especially stainless steels, require the opposite: Slower RPM, lower-gear cutting speeds allow needed torque and heat control. A finer-pitched blade, with reduced spacing of smaller, more geometrically-rigid teeth, can patiently chew it's way through tougher cuts that might completely destroy a coarse blade in minutes or even seconds.

**For this reason, the UW Physics Department Student Shop has two material-dedicated Vertical Band Saws.** One Vertical Band Saw is reserved for aluminum, wood, plastics, and other softer materials. The blade type and cutting speed are set-up for cutting these softer materials and are to remain so. The second Vertical Band Saw is dedicated to cutting tougher materials. It's set up with a fine pitched blade, at a much lower cutting speed and is intended to remain so. This arrangement is both for the practical convenience and efficiency of the student shop as a whole, as well as to protect the operators and equipment from incorrect vertical band sawing.

Vertical band saws are different from other fixed shop saws as they can make three types of cuts: Cross cuts or "cutoff" cuts, made perpendicular to the long axis of the workpiece. Rip cuts- cuts made parallel to the long axis of the workpiece. Radius or curved cuts – the narrow ribbon like nature of the blade allows the operator to turn the work piece about the blade while advancing the cut through the material. The minimum radius is about three times the blade width.

## Limitations

- Band saws must be set up with correct blade and speed settings for desired materials. Make sure to select the correct Vertical Bandsaw for your material and that its blade and speed are correct.
- Make sure all safety doors and panels are in their closed and locked positions.
- Fixture if Needed: The workpiece must be firmly supported by table at all times or body parts can become pinched. Without a proper vise or other fixturing, spherical or cylindrical objects may roll, spin, grab and pull you or the material into the blade.
- Avoid material that is too thin for the Vertical Bandsaw: There should be between two and three blade teeth engaged in the material during the cut. This is required for stability. If your material thickness and blade pitch won't allow this, you are probably better off using a shear.

**As always, whenever you have any questions regarding the safe operation of Student Shop equipment, find the Shop Instructor or another Instrument Maker and ask before you act.**

## Hazards

- Amputation: The fast moving cutting blade/band will quickly remove fingers. Be sure that the workpiece is the only object in the cutting path. Use a push-block whenever possible and ALWAYS keep fingers out of the cutting path.
- Nip and Pinch Points form Blade Motion: The moving blade can catch GLOVES, loose hair, clothing, jewelry and pull body parts into cutting edges pinch points.
- Cut and laceration: • Sharp edges are created by the cutting action.
- Blade hazard. • Blades can break and be thrown out of the work zone. nip pinch point:
- Hot objects: The cutting process can generate significant heat in the work piece and scrap material.
- Eye Hazards: Safety glasses or face shields are always required to protect the eyes from chips that often spray from the cut at high speed and temperature.
- Clear chips and dust periodically from the table and immediate area.

## Required Personal Protective Equipment (PPE)

- Safety Glasses and/or Face Shield. Eye protection should be worn at all times, including when handling or changing blade as well during saw operation.
- Closed-toe, sturdy footwear. Sturdy sneakers and other such footwear is the minimum level of allowable foot protection. Proper safety shoes or boots, with steel toes, electrical protections, etc. are preferred. Extremely lightweight sneakers and all sandals and flip-flops are not safe for vertical band saws or machine shops in general.
- Hearing protection is recommended in areas which exceed 85 decibels. Higher decibel levels can cause permanent hearing loss very quickly so hearing protection is always recommended in machine shop.
- Hair ties, hats, etc. to safely contain long hair if needed
- Sturdy, well-covering and comfortable clothing WITH NO LOOSE SLEEVES, SCARVES, etc. that could get pinched and pulled through the band saw.
- ABSOLUTELY NO GLOVES ARE TO BE WORN WHILE SAW IS RUNNING.

