

# BAND SAW FUNDAMENTALS

By

Gary Webster Sr.

## BLADE AND SAWING TERMINOLOGY

**Beam Strength** is the result of a combination of a blades hardness, thickness and width. A wider blade provides greater Beam Strength which usually produces straighter and smoother cuts. However, never use a blade wider than that specified by the saw builder.

**Cutting Edge** is the toothed edge of the blade from the points of the teeth to the base of the gullets. The rest of the blade is considered the back.

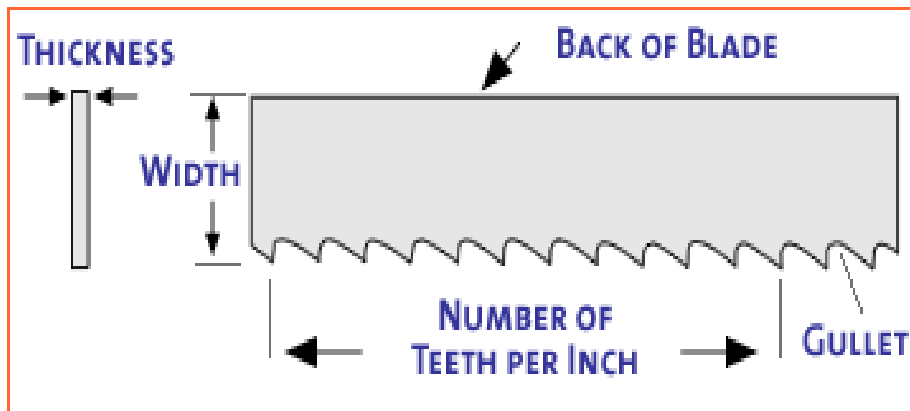
**Gullet** is the valley from the tip of one tooth to the tip of the next tooth. It is designed to carry the chip from the kerf.

**Kerf** is the cut in the material being sawed. The width of the kerf is determined by the thickness of the blade plus the set of the teeth.

**Set** that is given saw blades is actually the tilt or angle given to the teeth of the blade which provides clearance in the cut. The overall set to right and left is another factor in determining the width of the kerf.

**Tooth Pitch** is always measured in the number of teeth per inch---from tip of tooth to tip of tooth. Variable Tooth blades are indicated by two numbers since the tooth pitch and the gullet depth varies.

**Tooth Types** are determined by tooth shape. Examples are Regular, Hook, Skip, and Variable Tooth. Tooth types are designed to do different kinds of sawing. It is essential to match the blade to the job.



# BAND SAW BLADE GENERAL SELECTION GUIDE

## TOOTH SETS:

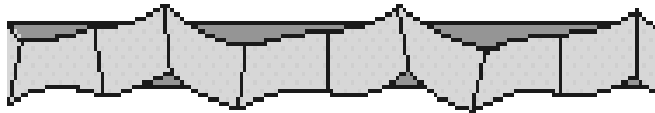
### ALTERNATING

- Each tooth is alternately set: one left, then one right and so on.
- Generally used in woodworking.



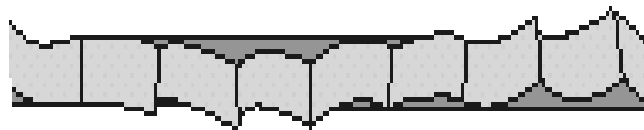
### RAKER

- One tooth tilted to the left then one to the right and the third one straight or "unset".
- Used in a wide range of applications.



### WAVY

- Groups of teeth that alternate left to right throughout the length of the blade.
- Generally used for metal cutting.



## BLADE COMPOSITION:

The two basic blade compositions are bi-metal and carbon steel. Bi-metal blades are primarily used in the cutting of metal stock. Carbon steel blades are more prevalent in the woodworking industry. (The teeth are hardened, making the blade extremely sharp and fast cutting with greater longevity).

# BAND SAW BLADE GENERAL SELECTION GUIDE

## TOOTH TYPES:

### REGULAR TOOTH:

- Straight faced tooth with deep gullets to rake out chips.
- Used mainly for general metal cutting.

**REGULAR TOOTH**



### SKIP TOOTH

- Very similar to the hook tooth but characterized by a straight 90 degree tooth and a sharp angle at the junction of the tooth and gullet. This type tends to break up the chips.
- Very popular in general wood working.
- Results in fairly smooth cut.

**SKIP TOOTH**



### HOOK TOOTH

- Widely spaced teeth and deep gullets with teeth that have a ten degree undercut face which helps to dig in and take a good cut while the gullets tend to curl the chips.
- Very aggressive blade that results in a rough cut, but best choice for cutting bowl blanks.

**HOOK TOOTH**



### VARIABLE TOOTH

- Varying set angles and gullet depths.
- Used mainly in production work of cutting metal.

**VARIABLE TOOTH**



# BAND SAW SAFETY

## **BEFORE OPERATION:**

1. Read and understand the band saw owner's manual before operation.
2. Familiarize yourself with the equipment. EX:
  - A. Power source requirements.
  - B. Controls.
  - C. Capabilities.
  - D. Limitations:
    - a. Material handling.
    - b. Accessory adaptation. (Do not use unauthorized accessories)
3. Ensure equipment & all its components are in good condition & proper working order and that all guards are in place. Check each time before use for damage or wear.
4. Ensure all adjustments are correct according to the blade you are using:
  - A. Blade guides.
  - B. Thrust bearings.
  - C. Blade tracking.
  - D. Blade tension. (Relieve blade tension when machine is not in use. This will help ensure the integrity of the blade and the tensioning components.)(This is also a good safety practice in case of accidental start-up)

**NOTE:** Be sure machine is unplugged from electrical source when making adjustments.

5. Use proper blade for the job and material requirements. DO NOT use a small blade for large work or a wide blade for a tight radius.
6. Keep blade guard adjusted as close to the material being cut as possible without interfering with its movement.
7. Avoid a dangerous work environment. EX:
  - A. Dampness/moisture.
  - B. Flammable liquids or gasses.
  - C. Cold (temperatures below 45° F may result in a broken blade!)
8. Maintain a clean work environment. NO CLUTTER to trip over, etc. Keep the saw's table area clear of all scraps for safe and proper material movement.
9. Keep children away from machinery. Child proof the area (safety switches, etc.)
10. Never leave machine running unattended! Do not leave until it has come to a complete stop!
11. DO NOT OPERATE WHILE UNDER THE INFLUENCE OF ALCOHOL, DRUGS OR ANY MEDICATION THAT WILL AFFECT YOUR JUDGEMENT! STAY FOCUSED!!!!!!!

12. Avoid wearing long sleeves and jewelry. Secure long hair and any other loose clothing that could get caught in moving parts!
13. Use appropriate safety gear:
  - A. Safety glasses or goggles or full-face shield if there will be excessive debris.
  - B. Dust mask and/or dust collection may be necessary.
  - C. Some circumstances may dictate hearing protection.
14. Keep hands and fingers away from the blade. NEVER feed the stock with hands or fingers in line with the blade or reaching across the blade. USE THE 3-INCH RULE! (Keep all body parts a minimum of three (3) inches away from blade at all times!) Use of a push stick may enhance safe operation.
15. Secure work. When possible use appropriate clamps or jigs.

## **OPERATION MODE:**

1. Prepare the material to be cut.
  - A. Bottom of material should be as flat as possible to mate well with the table surface. This will ensure smoother cutting with less chance of blade binding and stalling the motor. This occurs when a protrusion on bottom of wood comes in contact with side of table and it must be lifted to some degree to continue forward motion. The kerf in the wood will then be in direct conflict with the blade and cause it to bind. This is a common problem with bowl blanks as most have been dissected with a chain saw, increasing the chance of this occurrence. Most board stock will not have this scenario since it comes from re-sawing machinery.
  - B. Size the log or board according to your band saw's capacity. Do not exceed the saw's throat depth. If you start sawing a bowl blank with log at a 45° angle and if that point towards end of log exceeds the throat depth, you will not be able to continue with the cut as the log will come in contact with the machine's frame.
2. Never hold the stock above table when feeding into blade. It must remain flat on table at all times.
3. Do not start the saw with stock already in contact with the blade.
4. Allow motor to come up to full speed before feeding stock into blade.
5. Do not force material into blade at a rate faster than it can be readily cut. **AGGRESSION LEADS TO MISTAKES!**
6. Remember the 3-inch rule!
7. Shut off machine to remove jammed wood!!
8. Backing stock out of blade with machine still running is a bad practice! It most generally will cause blade to track right off of wheels, besides causing other potential hazardous situations, including possible blade breakage!
9. On extremely difficult pieces, relief cuts may help in cutting tight radiuses.

10. NEVER cut round stock freehand on a band saw. The material will roll, (self-feed) into the blade and can cause some unpredictable hazardous situations. If cutting round stock is absolutely necessary, use of a suitable holding jig is a must!
11. If blade does get into a binding position and motor begins to stall, discontinue forward motion of work piece to give saw a quick relief moment and a chance to regain speed. If it does not, shut saw off before trying to correct the problem.
12. If blade breaks, shut off saw immediately! Replace and adjust according to instruction manual.
13. Use extreme caution when handling saw blades. Coiling and uncoiling band saw blades pose its own threats! Use eye protection and protective gloves.
14. After shutting off power, band saw should not be stopped by thrusting a piece of wood against the cutting edge or side of the blade. Allow saw to stop on its own. Larger commercial units **may** be equipped with braking devices.
15. KNOW THE LOCATION OF THE OFF SWITCH AND/OR EMERGENCY DISCONNECT!

### **CUTTING CIRCLES AND/OR BOWL BLANKS:**

1. Proper blade selection is important. Determined by
  - A. Thickness of material to be cut.
  - B. Type of material to be cut. (dry, wet, composition?)
  - C. Desired finish of cut.
  - D. Radius
2. General rule of thumb: The thinner the material and the tighter the radius, a narrow blade with more TPI may be used. This will generally provide a more finished-type cut. On thicker material with a larger radius to be cut, a wider **hook tooth** blade with less TPI should be used. This will cause a rougher cut in the material, but will provide the aggression necessary to make the cut. This is especially important in cutting green wood bowl blanks. A 3/8 to 1/2 wide hook tooth blade with 3 to 4 teeth per inch set will do an excellent job in cutting green wood bowl blanks. Two important considerations on this matter:
  - A. Always use the widest blade possible that will readily cut the attempted radius.
  - B. Will your band saw's motor and rpm power a 3 or 4 tooth blade through the stock you are attempting to cut? If not, reconsider the TPI. (teeth per inch)

Emphasis on the general rule of thumb in item 2, page three: These are just some basic guidelines. Consider each piece to be cut carefully. Research blade applications for proper selection of blade for a good match to both the stock you are cutting and your particular band saw.

3. Marking your stock for cutting circles:
  - A. Flat stock can be marked with a compass or with a template using a marker/pencil.
  - B. Some flat stock may also be cut using a circle-cutting jig that is an appropriate and acceptable match for your saw.

- C. Bowl blanks, or half logs, should be cut with a template temporarily attached to the center of bowl crown. Carefully cut around template in close proximity without touching the template. (You will probably want to use it again!)
4. Template compositions: There are several ideas floating around in the woodworking world of what can be used for templates for cutting bowl blanks, from cardboard, thin plywood, Masonite, to Plexiglas. If contact with the blade could be avoided, probably any of these could be used. However, it is a given certainty that contact with the blade will be made at some point!!! Therefore, Plexiglas should be avoided as it may shatter, causing a potential hazard. Masonite and thin plywood or something similar may be better to some degree, but still may pose a similar threat. In conclusion, it seems that the safest (and cheapest!) of these is cardboard. Cardboard is easily available, easy to cut and will usually just flop a bit if it contacts the moving blade.
  5. When cutting circles, use a slow, smooth, continual forward motion into the blade for best results, letting the blade do the work. Refrain from pulling back on the stock at any time. As mentioned before, this may result in the blade coming off the wheels, which could result in a broken blade and/or potential hazardous situation. Continue cutting the full circumference and upon completion, exit the blade through the short side of stock.

**Disclaimer: The information in this document was compiled from research of various websites and manual instructions. It is intended to be educational in nature, assisting those whom may need general information and guidelines on band saw safety and operation. It is by no means conclusive as band saws and their accessories differ to some degree just as the materials to be cut do. The compiler of this information and the OVWG assumes no responsibility for any manner in which this information may be used or for the welfare/well-being and safety of the user. It is the responsibility of every band saw owner/operator to do their own research on band saws and the safe operation thereof and to read and understand the saw's owner manual. It is suggested that anyone who is interested in obtaining and using a band saw, purchase a good book on the subject! When in doubt, ask someone or a dealer who is proficient on the matter.**