

Design of Wood Cutting Band Saw

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Abstract -- A sawing machine is a machine tool designed to cut off bar stock, tubing, pipe, or any metal stock within its capacity, or to cut sheet stock to desired contours. The sawing machine functions by bringing a saw blade containing cutting teeth in contact with the work piece to be cut, and drawing the cutting teeth through the work piece. The sawing machine is much faster and easier than hand sawing, and is used principally to produce an accurate square or mitered cut on rectangular or cylindrical material. One of the two common types of sawing machines used for metal cutting in the machine shop is the band saw machine. The band saw machine cuts by drawing a continuous metal band, called a band saw blade, across the work piece. The band saw blade is supported and driven by a drive wheel and an idler wheel. A band saw is a power saw with a long, sharp blade consisting of a continuous band of toothed metal stretched between two or more wheels to cut material. They are used principally in woodworking, metalworking, and lumbering, but may cut a variety of materials. Advantages include uniform cutting action as a result of an evenly distributed tooth load, and the ability to cut irregular or curved shapes like a jigsaw. The minimum radius of a curve is determined by the width of the band and its kerfs. Most band saws have two wheels rotating in the same plane, one of which is powered, although some may have three or four to distribute the load. The blade itself can come in a variety of sizes and tooth pitches (teeth per inch, or TPI), which enables the machine to be highly versatile and able to cut a wide variety of materials including wood, metal and plastic. Almost all band saws today are powered by an electric motor. Line shaft versions were once common but are now antiques

Indexed Terms: saw, rectangular, cylindrical, kerfs, curved shape

I. INTRODUCTION

The idea of the band saw dates back to at least 1809, when William Newberry received a British patent for the idea, but band saws remained impractical largely because of the inability to produce accurate and durable blades using the technology of the day. Constant flexing of the blade over the wheels caused either the material or the joint welding it into a loop

to fail. Nearly 40 years passed before Frenchwoman Anne Paulin Crepin devised a welding technique overcoming this hurdle. She applied for a patent in 1846, and soon afterward sold the right to employ it to manufacturer A. Perin & Company of Paris. Combining this method with new steel alloys and advanced tempering techniques allowed Perin to create the first modern band saw blade.

The first American band saw patent was granted to Benjamin Barker of Ellsworth, Maine, in January 1836. The first factory produced and commercially available band saw in the U.S. was by a design of Paul Prybil Power hacksaws (with reciprocating blades) were once common in the metalworking industries. A wide variety of woodworking projects are created each day with band saws. One of the most common projects is adding design work to larger pieces. For example, carpenters may use a band saw to add detailed trim to a home or piece of furniture. Many woodworkers use band saws to create home decor items. A few items that can be easily created are picture frames, boxes, and detail-rich tables and chairs. Children's toys such as cars, puzzles, and pull-behind toys can also be made with this tool.

- Mastering teeth selection

Band saw blades are not a „one size fits all“ deal. There is an art to tooth selection. If you want to get maximum lifespan out of your band saw blade, you need to select the right one for the work you're putting it to. Both too many and too few teeth can lead to cracking and blade fatigue. Cutting thin-walled products with coarse-tooth blades will result in breakages. Likewise, cutting a thick section with a fine-toothed blade will cause the gullets to fill with swarf and, once again, you're looking at breakages.

Method: The crew at Adler recommend going for an average of 5-7 teeth in the cut, at any given time. Perfecting your blade tension

Your first thought might be that backing off the tension will help preserve the blade. However, bandsaw blades are not like people, tension doesn't make them snap. In fact, a good amount of tension will actually maximise the performance and longevity of your blade. Adler recommends the „Dependable Precision“ method which involves keeping tension high but measured. While many bandsaw machines come with a tension gauge, and this can be. A good secondary tool, Adler recommend developing a feel for tension yourself. This way you train your fingers to know what works by muscle memory.

Method: Make sure your bandsaw machine is switched off. Then, place the palm of your hand on the *back edge* of the blade and, with close to as much pressure as you can, try to push it vertically out of the guides. Ideally, you want no more than 1-2mm movement. If you're getting any more than this, you need to up your band saw blade's tension.

- Breaking-in your band saw blade

While it's tempting to just get straight into work-mode, not properly running-in a new blade will cost you in the long term. To manufacture bi-metal band saw blades, high-speed steel strips are welded onto backing bands. The teeth are systematically cut and ground from the high-speed steel strips to create a sharp cutting-edge on each and every tooth. While a fresh, new band saw blade is a beautiful piece of workmanship and a powerful tool, it needs to be broken in correctly. If not, you run the risk of destroying it with your first cut.

Method: The first thing you need to do is halve your down-feed rate. Then, with coolant flowing, spend 15 minutes cutting through a solid piece of mild steel. This gently hones the fresh teeth, ensures they are all aligned, and minimizes your risk of breakages.

- Cutting with coolant

This is a vital component to extending the life of your bandsaw blade. Coolant gives you three fundamental benefits: washing the swarf out of the cut; cooling the tooth edge; lubricating the whole cutting process.

Without coolant, you'll have heat building up in the teeth which can cause the swarf to weld itself onto the blade.

Method: This one is so simple the title said it all. Cut with coolant!

II. INVESTIGATION

Bandsaw blades are one of the most commonly used tools of the wood cutting industry. Their base materials are mostly unalloyed or poorly Cr-alloyed tool steels. After the review of the band saw blade's cyclic load characteristics, we present the typical failures, which can be, originate in it's cracking. With the use of these information an overall systematization has been set up by the bandsaw blade cracking types and its root causes. The main place of the failure is the weld and the 0heat-affected zone's area where the welding can failure or the lack of toughness can produce cracking. An other zone, where cracking may appear is the bandsaw blade's tooth gullet because it raises the stress intensity factor. Special material testing methods have been made to investigate the tooth gullet's notch sensitivity from the test results that a comparison of several bandsaw blade base material, are reviewed. With the use of the results a notch sensitivity rating system has been worked out, which can be used to rate different bandsaw blade base material's notch sensitivity.

The base materials of the bandsaw blades are typically unalloyed or low Cr-alloyed tool steels. The generally used steels are C60, C75, C75Cr and 50CrV4. These steels are used in a toughened condition, and the saw tooth is made with hard metal or high-speed tool metal plate . The stresses of these tools are turn up by three different reasons: a) The pre stress of the tool (uniaxial stress). b) Bending when the tool bends on the drive wheel. c) Cutting environmental stresses. To investigate the complex stresses of the third group a separate research is needed



Fig. 1: Shows wood cutting band saw

III. MATERIALS AND TOOLS REQUIRED FOR MANUFACTURING OF BAND SAW

MATERIALS:

- Wood
- 7000 rpm motor
- Rubber tube
- Sheet metal
- Super glue
- C-clamp
- Circular ring

Instead of wood if the metal or different alloys are used there are some limitations they are:

1. Metal can get rusted if used for prolonged
2. High initial cost
3. Post fabrication process
4. Limited design
5. Expensive if robust design is needed

MOTOR:

Motor is used with the speed of 7000 rpm (revolution per minute) to spin the belts and drive the mechanism and blade. This is the common motor and to run this motor 12v battery is required.

RUBBER TUBE:

Rubber tube is used and cut to make belts to drive the circular wooden pieces and with the help of the rubber belts link is connected to the motor and wooden piece

SHEET METAL:

It is used in only making of blade which acts as a circular motion and cuts the material. It is made as a band and shaped into a saw naming it as bandsaw.

TOOLS:

To make a bandsaw we require different tools available in workshop that includes hand tools and machine tools, different types of tools used in making a bandsaw are

1. Claw hammer
2. Chisel
3. The hand saw
4. Drill machine
5. Soldering machine
6. Nails
7. Straight snip
8. Hack saw
9. Nuts and bolts
10. Straight files

IV. SPECIFICATIONS OF BAND SAW

- Band saw blades are manufactured in two forms. They are supplied in rolls of 50 to 500 feet bands. Band saw blade, also supplied in continuous welded bands in standard sizes for machines having no provisions for welding blade bands.
- The pitch of band saw blade teeth is the number of teeth per linear inch of the blade. For example, if a blade has 14 teeth per inch (tpi), it has a pitch of 14, or it may be referred to as a 14•pitch blade. Metal, cutting band saw blades range from 6 to 32 teeth per inch.
- Blade Width. When straight sawing, the widest blade available of the proper pitch should be used.

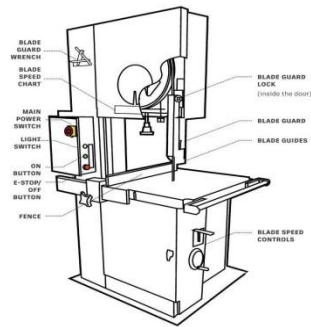


Fig. 2: The Specifications are shown in figure.

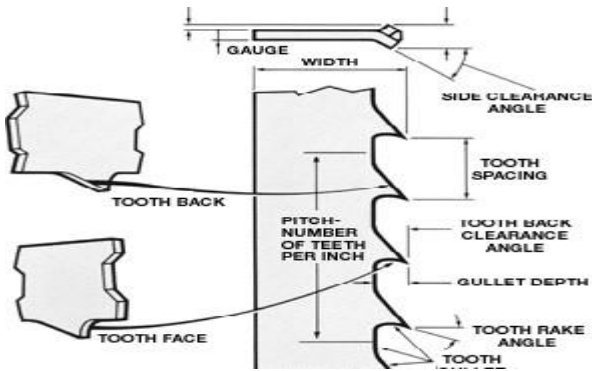


Fig. 3: Angles and Profile

V. DESIGN OF WOOD BANDSAW CUTTING MACHINE

Model 1612-0 band saw

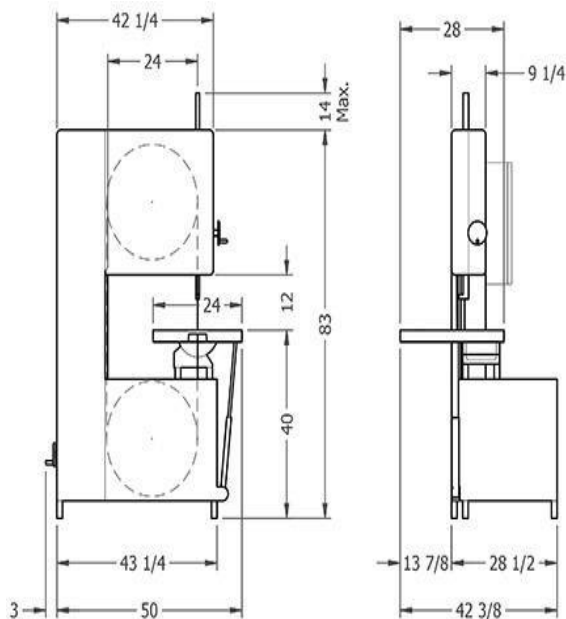


Fig. 4: Design and specifications

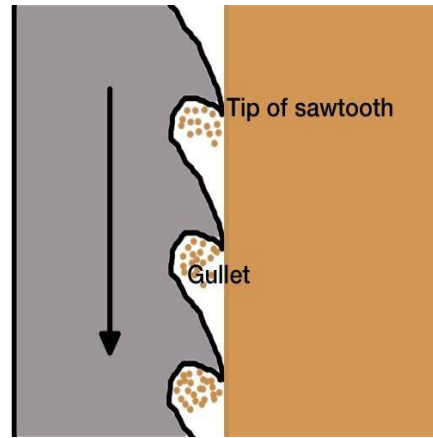


Fig. 5: Tip of Band Saw, Gullet

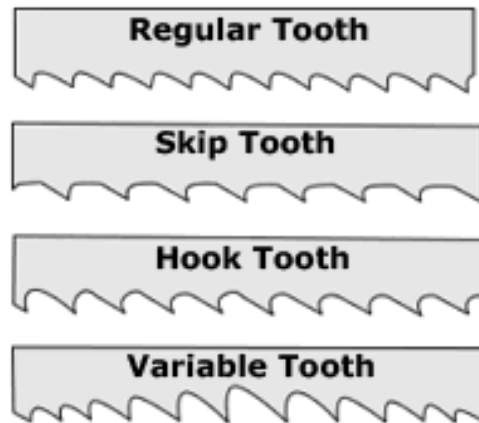


Fig. 6: Types of Teeth

VI. RESULT AND DISCUSSIONS

- Band saw cutting machine can cut 20 to 30 mm width.
- Finishing occur with accurate dimensions.
- Rubber pipes up to 120 mm can be cut.
- Eco-Friendly machine.
- Irregular shapes can be cut in this machine.

VII. CONCLUSION

To get the perfect type of shapes in cutting wood or metal we require accuracy and smooth finishing in order to get this we require a good machine which completes our desires for this band saw is a perfect match for these operations In making of the band saw we faced many difficulties in obtaining the circular wooden shapes and this problem can be eliminated

with the help of band saw and we can make any kind of irregular shapes of woods.

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