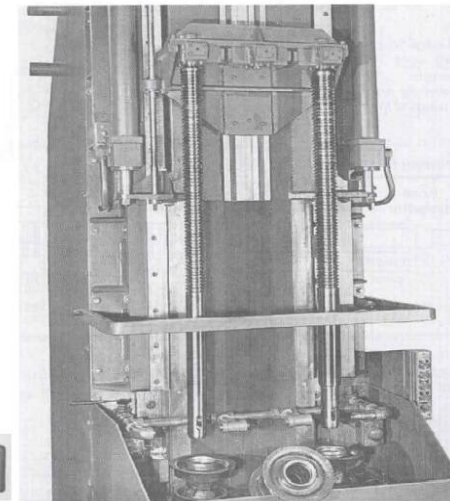
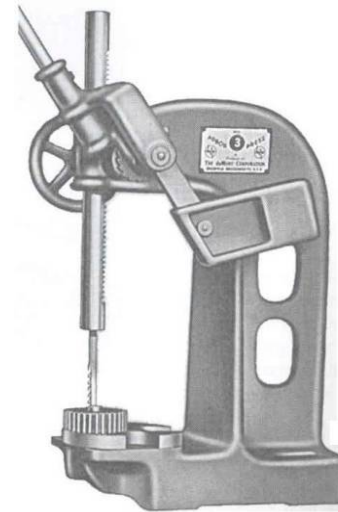
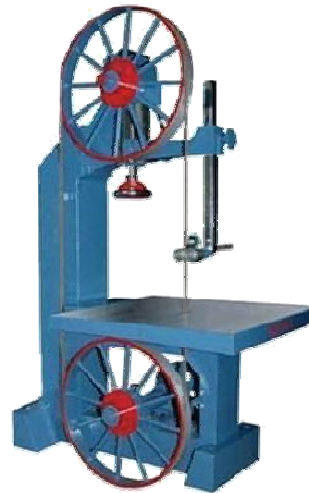


Ch-7 Sawing & Broaching Machines



Subject:- MP
Code:-3141908

Prepared by:
Asst.Prof.Harin Prajapati
(Mechanical Department,ACET)



What is **METAL
SAWING** Machine?

METAL SAWING

- Saw is a multipoint cutting tool, which is used in sawing operation. In this operation a large number of teeth move through the workpiece, each successive tooth deepens the cut made by its predecessor tooth.
- Materials like **wood** and **metals** are often cut using sawing machines.
- **Advantages of sawing machine:**
 1. Speed of cutting
 2. Low wastage of material
 3. Good quality of dimensional accuracy
 4. Low power consumption

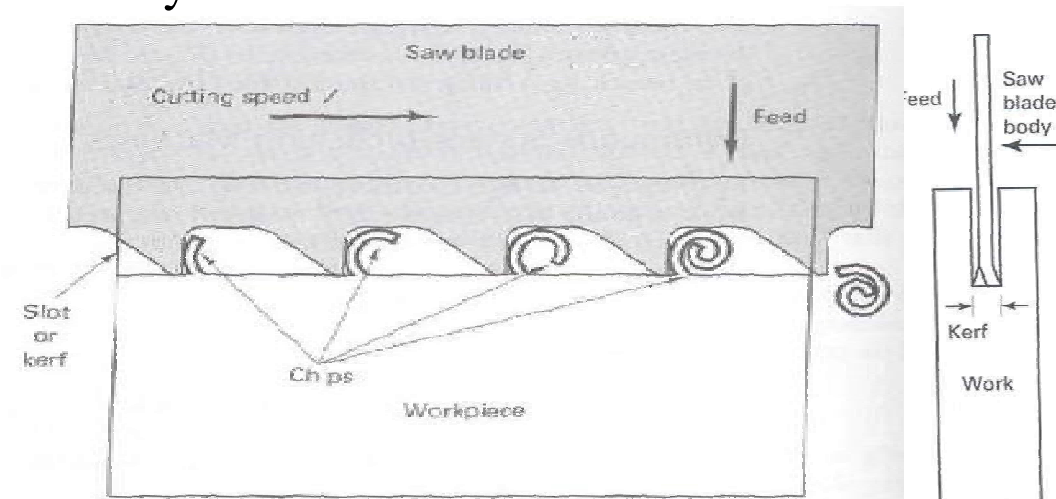
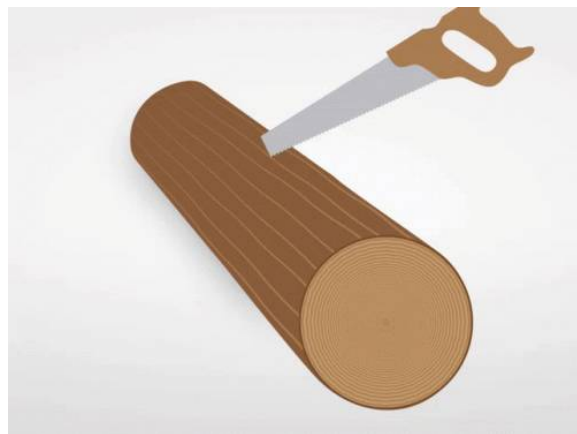


FIGURE 26-15 Formation of chips in sawing. (Courtesy of DeALL Company.)

chips =>transported by the space between the teeth =>gullets

CUTTING TOOLS

Saw Blades

Three basic configurations

1. Hacksaw blade (rigid blade)

Straight, limited length, teeth on one edge

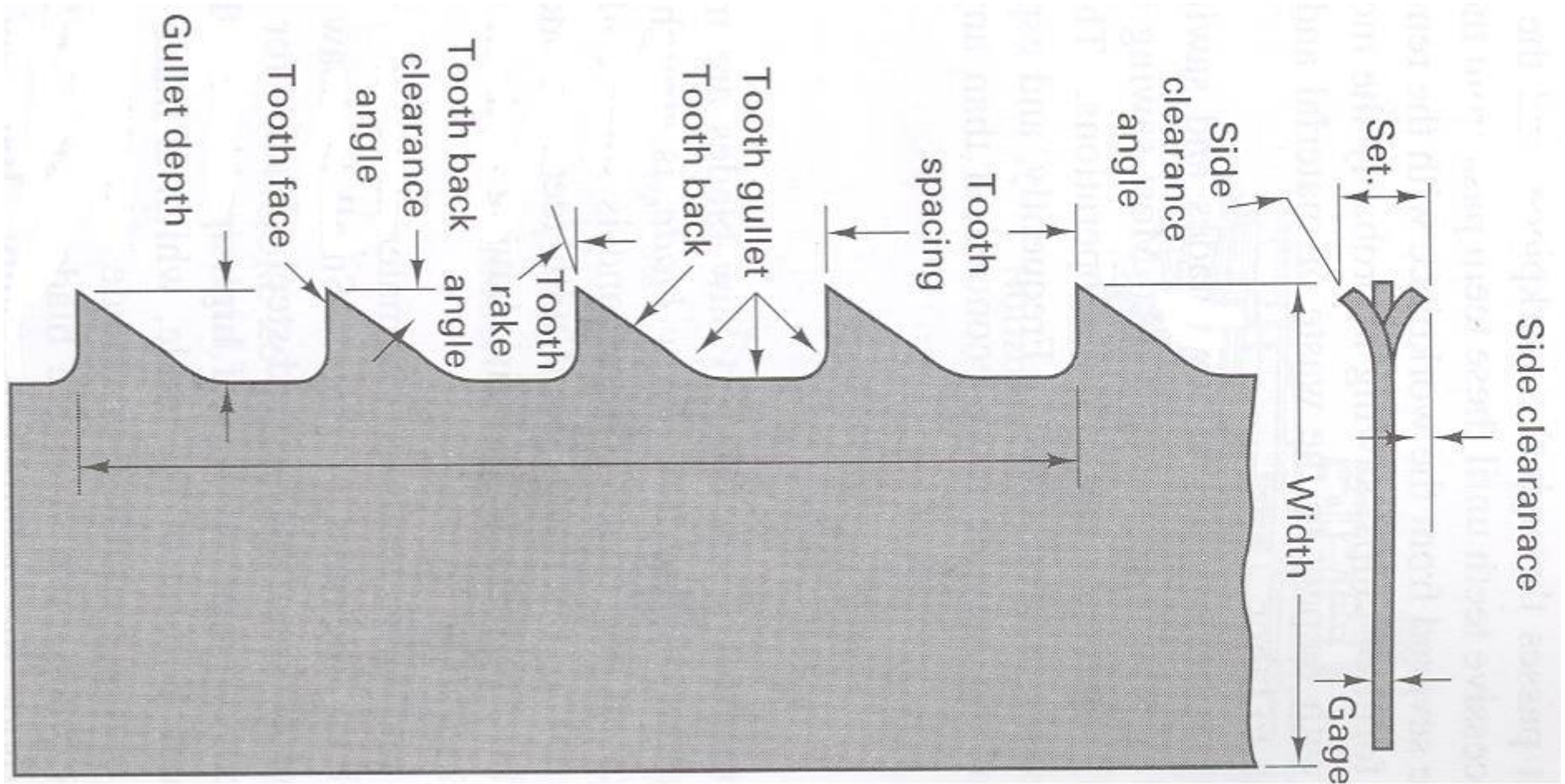
2. Band-saw blade (flexible band –turned around)

Flexible, long, continuous band

3. Circular saw (rigid disk)

Due to action of rubbing or friction between the abrasive particles and work piece material is removed.

Standard Nomenclature for a Saw Blade



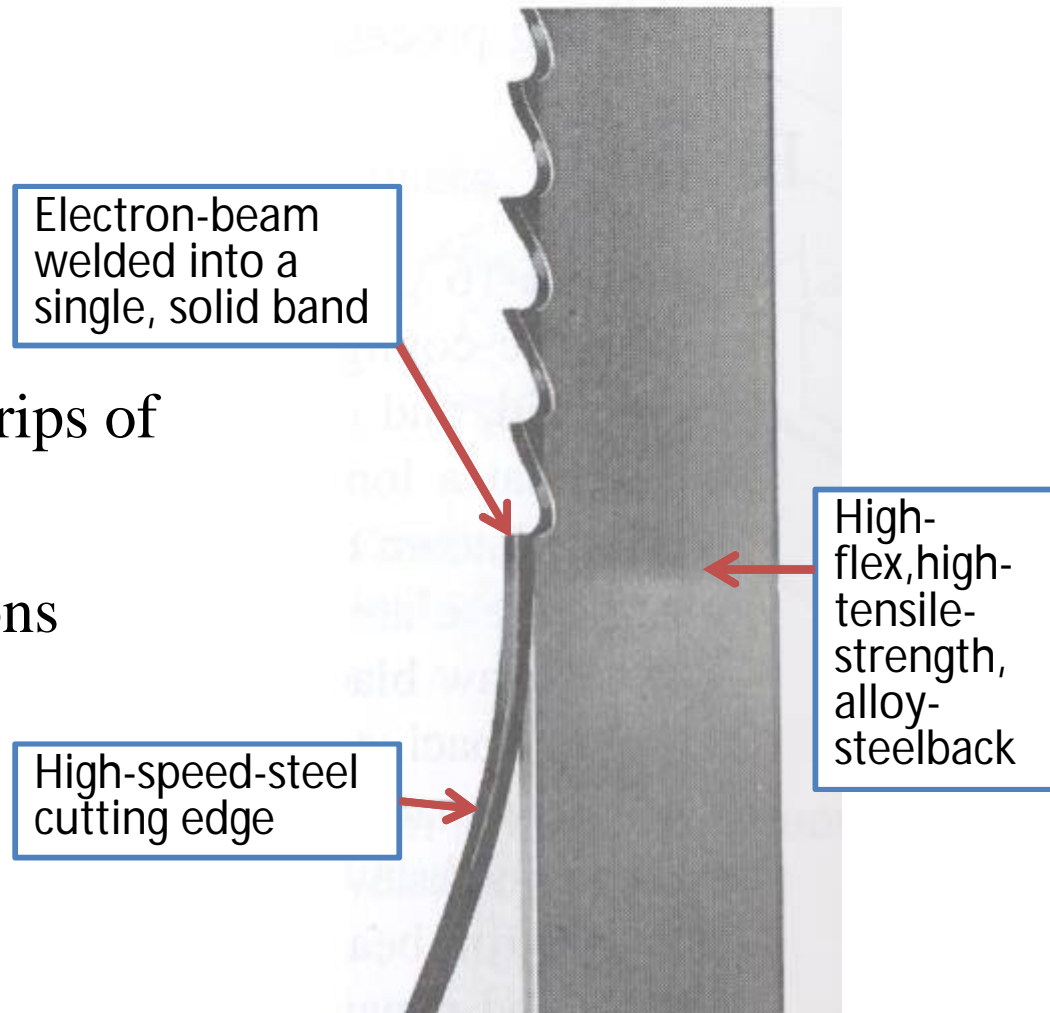
Tool Common Features



- A. Material for blade**
- B. Tooth form**
- C. Tooth Spacing**
- D. Tooth set**
- E. Blade thickness**

A. Material

- Small blades
- high speed steel
- carbon steel
- Longer blade-combined strips of HSS strips
- Large size-carbide insertions



B. Tooth Form

1. Straight tooth
2. Undercut tooth (clear tooth)
3. Skip tooth for rough cutting

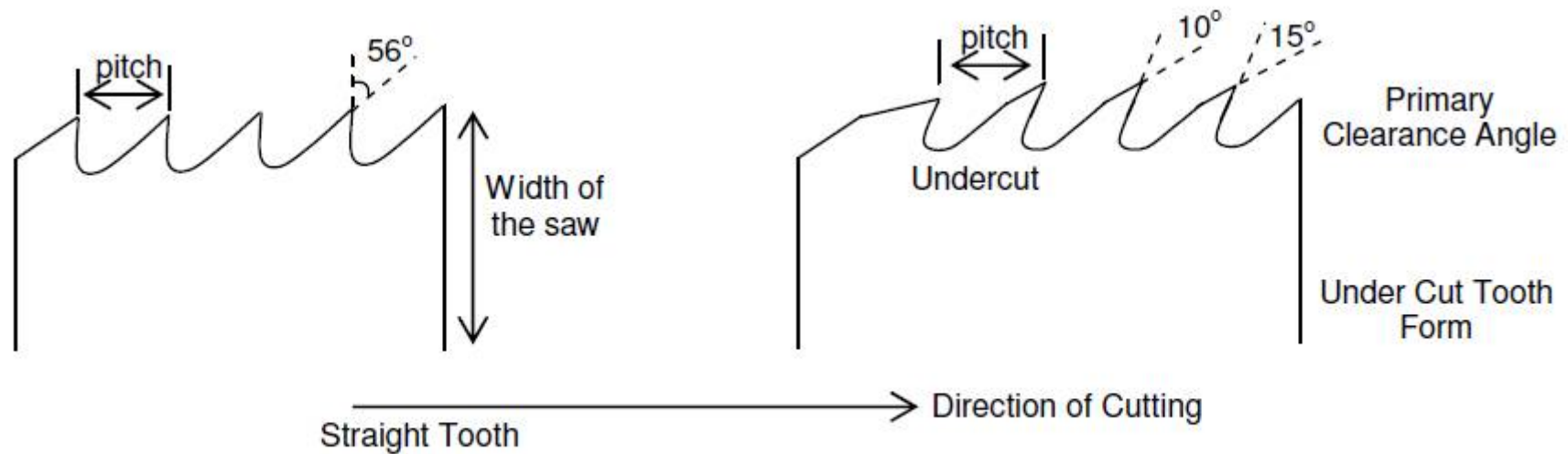
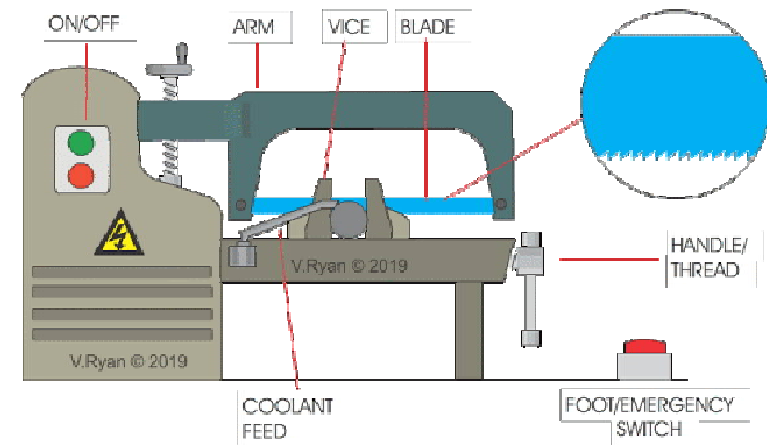


Figure 7.1 : Tooth Forms

C. Tooth spacing

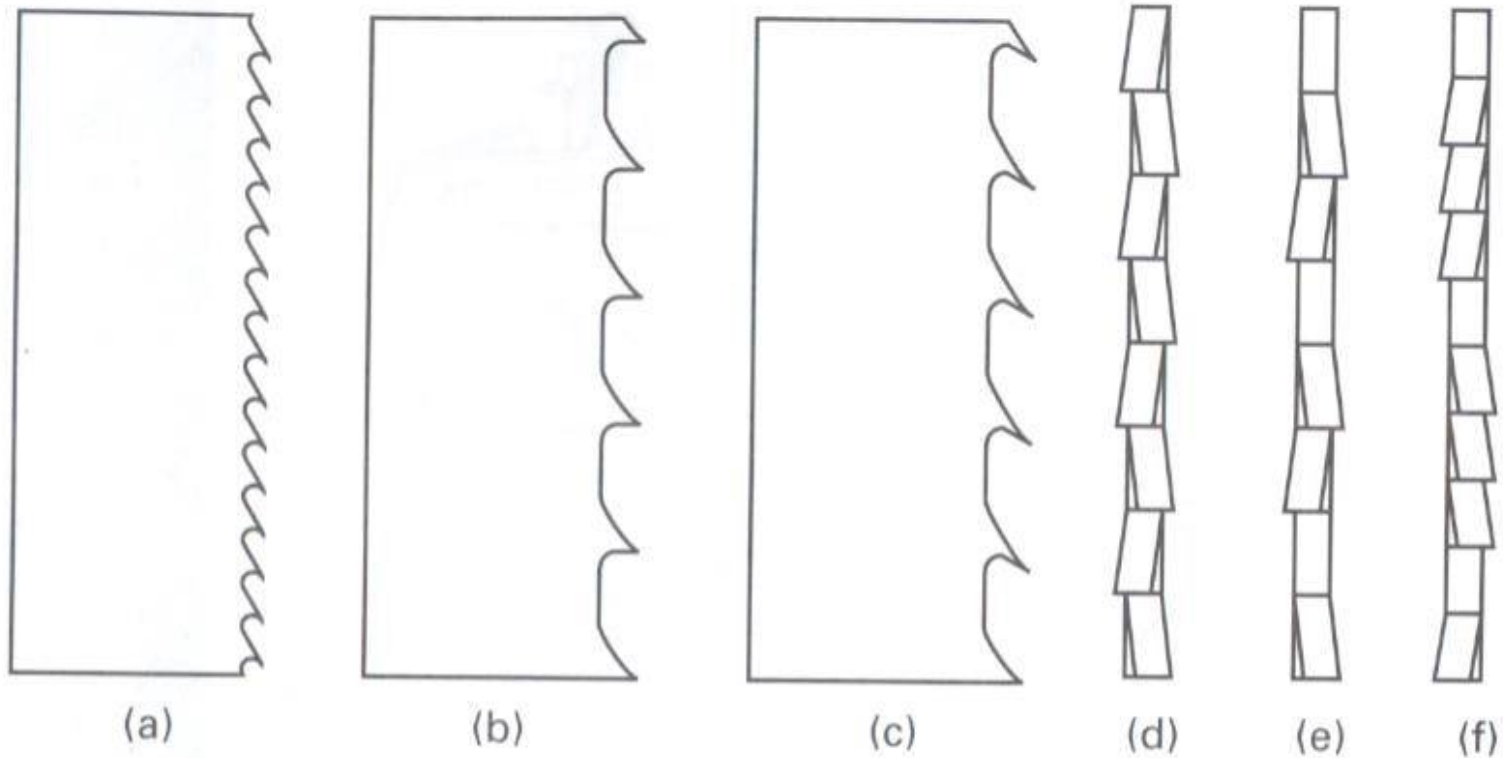
Determines

- Size of the teeth
- Size of the gullet, the space for chips
- Strength of the tooth
- Number of teeth engaging with the workpiece.

< 1.5 mm → hand saws (0.8 → 1.8)

> 1.5 mm → power hacksaws (1.4 → 6.4) machine.

C. Tooth spacing



- (a) Regular or standard tooth for ferrous metal, general purpose cutting
- (b) Skip tooth with large gullets for machining softer, nonferrous metals
- (c) Hook (10° positive rake) tooth for harder nonferrous alloys
- (d) Symmetrical tooth straight set saw for brass & plastic
- (e) Raker tooth set for general purpose sawing, uniform thickness
- (f) Wavy tooth set for thin, or non uniform thickness of stock.

D. Tooth Set

- Saw teeth are given an offset to the side known as **set to produce cuts which are wider than the thickness of back of the blade or disc.**

- Three common types of saw tooth sets are shown in Fig.

1. A straight set has one tooth set to the right and the next to the left. Saws with this type of set are used for cutting brass, copper & plastics.

2. In a rocker set one straight tooth is followed by two teeth set in opposite direction. This set used for most steel and cast iron cutting.

3. A wavy set comprises of an alternate arrangement of several teeth set to the right and several teeth set to the left. This arrangement is used for cutting tubes and thin sheets of metal.

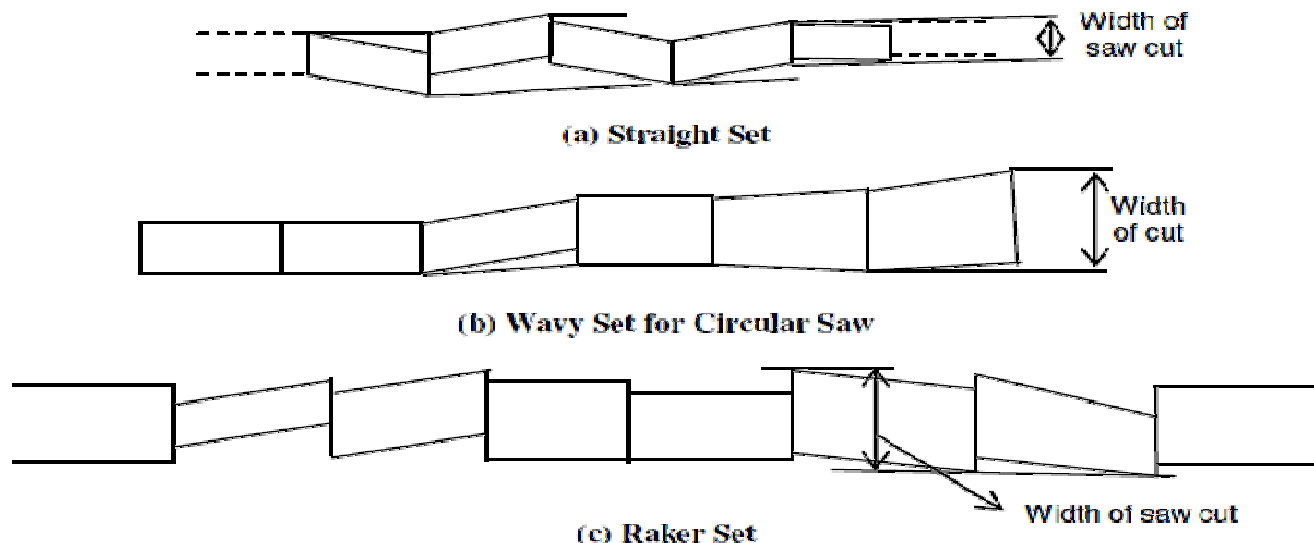


Figure 7.2 : Saw Tooth Sets

E. Blade Thickness

- Hack saw blades are straight strips.

1 to 3 mm thick, 15 to 65 mm wide and 300 to 1000 mm long.

- Circular saw discs vary from 1 to 6 mm in thickness & 200 to 1000 mm in diameter. The heavier the cut larger will be blade size in general.

- Band saws run from 0.5 to 1.5 mm thick & 1.5 to 25 mm in width.

- The narrower bands are used to cut smaller radii.

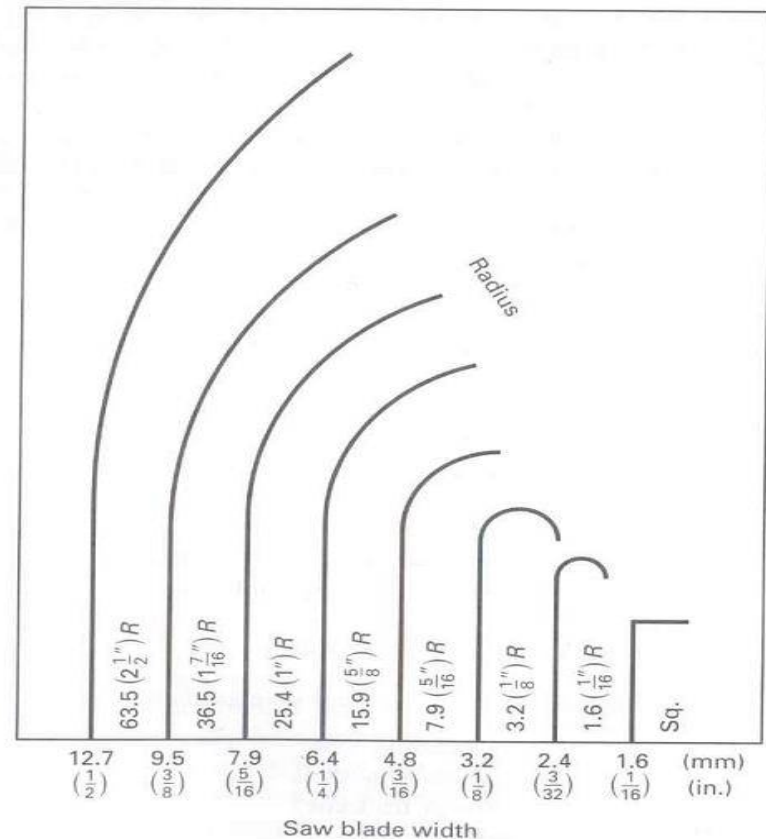
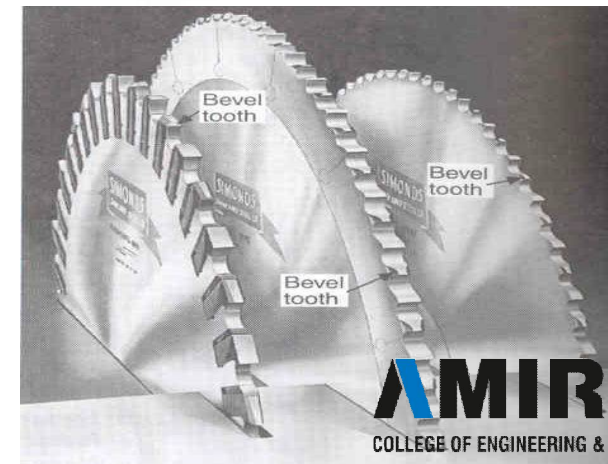


FIGURE 26-19 Relationship of bandsaw width to the minimum radius that can be cut.

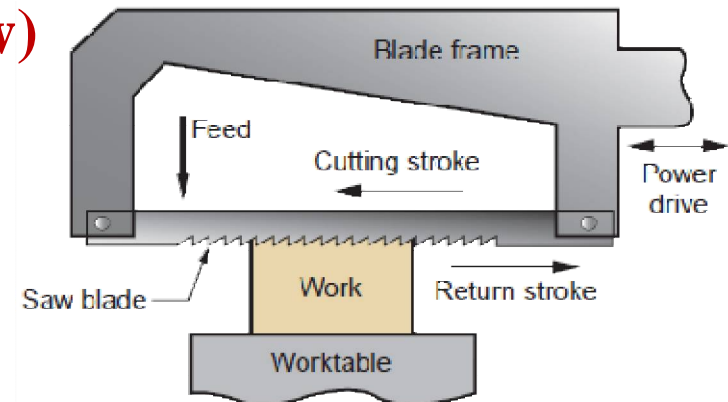


TYPES OF SAWING MACHINES

In general the sawing machines are classified as :

(a) Reciprocating saw (Power Hacksaw)

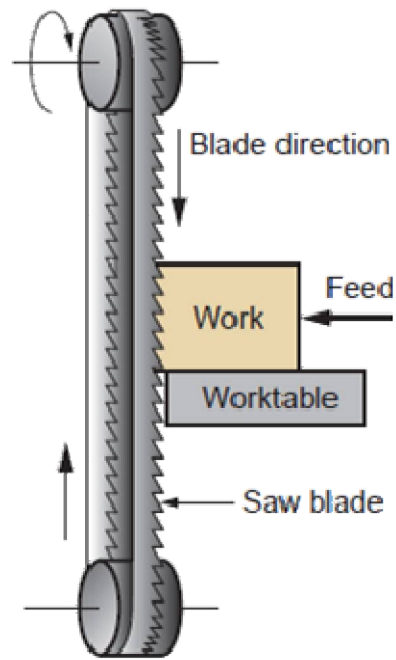
1. Horizontal sawing machine
2. Vertical sawing machine



(a)

(b) Band saws

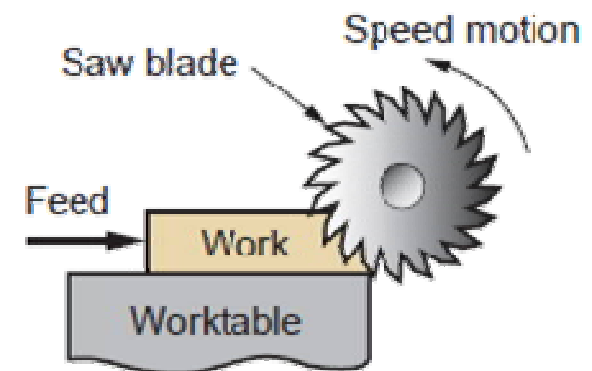
1. Contour band saw
2. Friction blade



(b)

(c) Circular saws

1. Cold saw
2. Friction disc
3. Abrasive disc



RECIPROCATING SAW

Known as power hack saws

• Consists of Rec. Saws:

1. Saw frame
2. Means for reciprocating the saw and frames
3. Work table and vice
4. Supporting base
5. Source of power

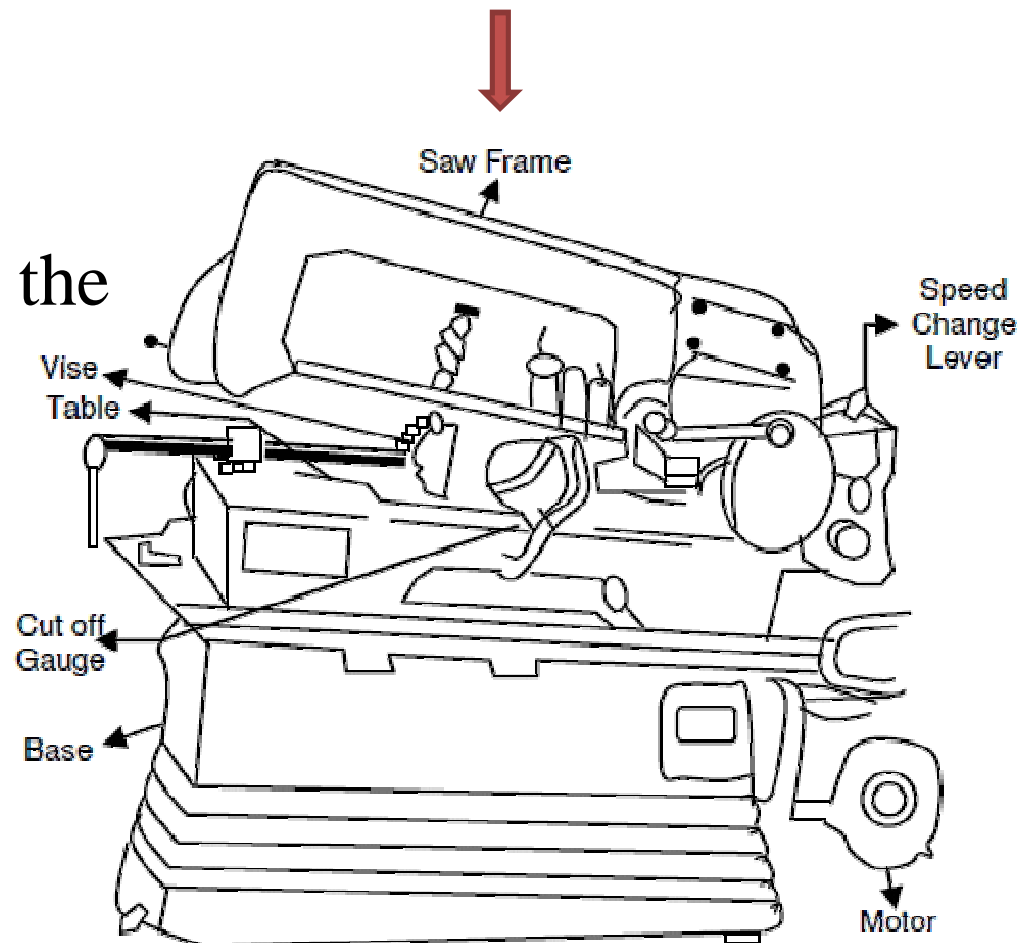


Figure 7.3 : Reciprocating Power Hack Saw

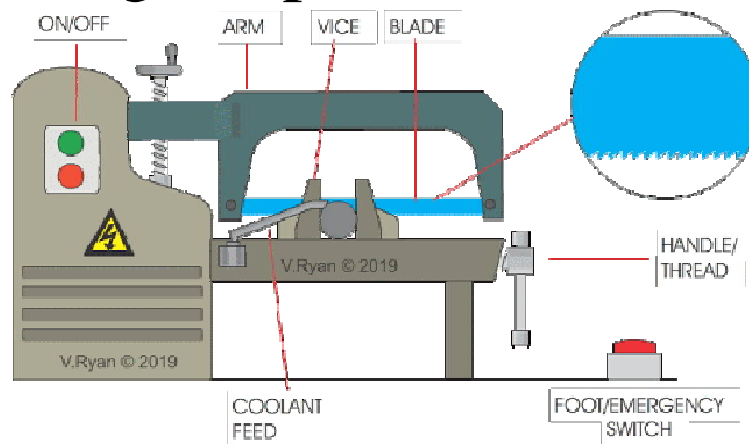
RECIPROCATING SAW

Most of the operations are hydraulically controlled

- Both square and angular cuts can be made

Operation of reciprocating saw

- Machine drives a blade back and forth through a work piece, pressing down on the cutting stroke and releasing the pressure on the return



BAND SAWS

- Band saw consist of endless saw blade sued to a greater extent for cut off and straight sawing operations for metals
- A continuous saw blade runs over the rims of two wheels on the machine



BAND SAWS

1. CONTOUR BANDSAW

- Work may be fed in any direction on the table.
- Direction of feed is readily controlled and changed while cutting is in process.



2. FRICTION BANDSAW

- The dull blade produces great friction and the kerfs of the teeth removes small, softened particles of the work



BAND SAWS

Vertical Band Saw Machine

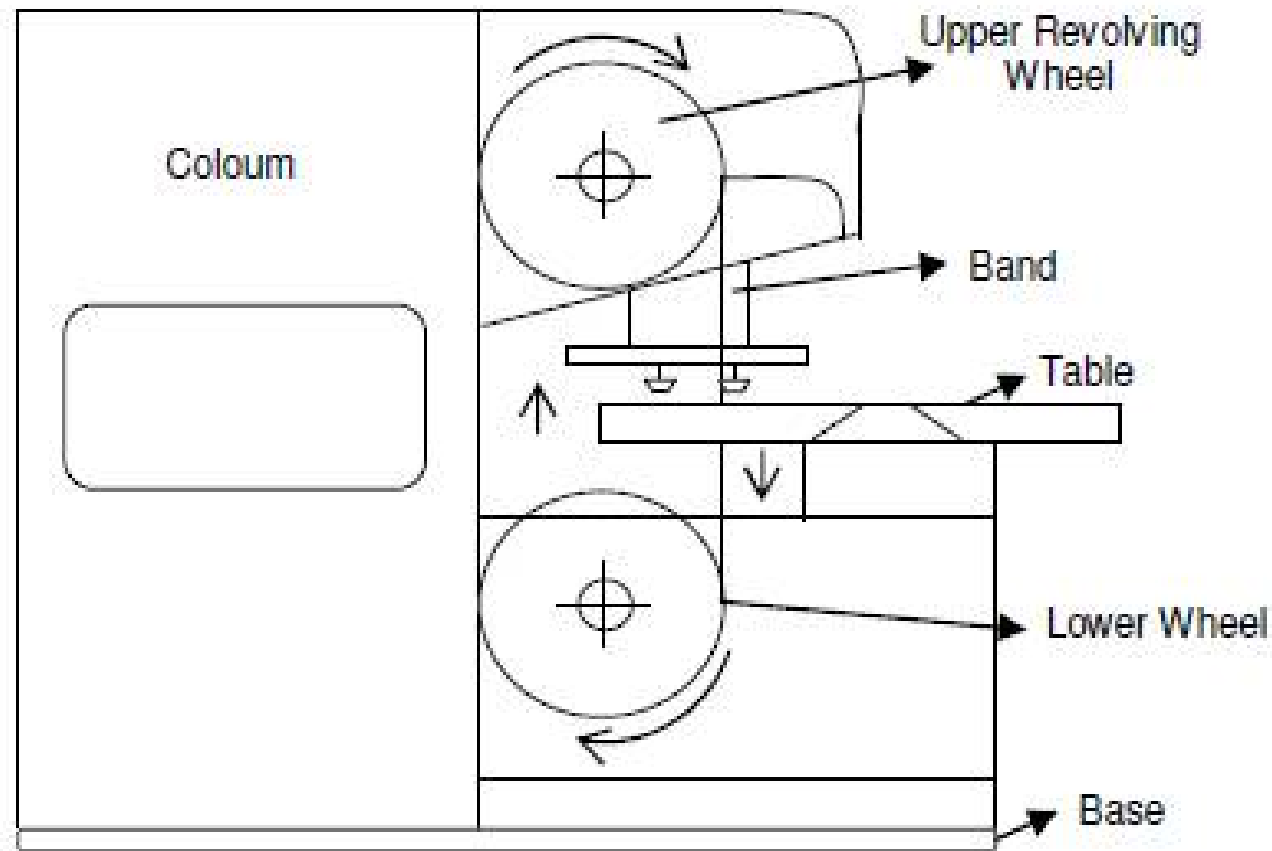


Figure 7.4 : Vertical Band Saw

BAND SAWS

Horizontal Band Saw

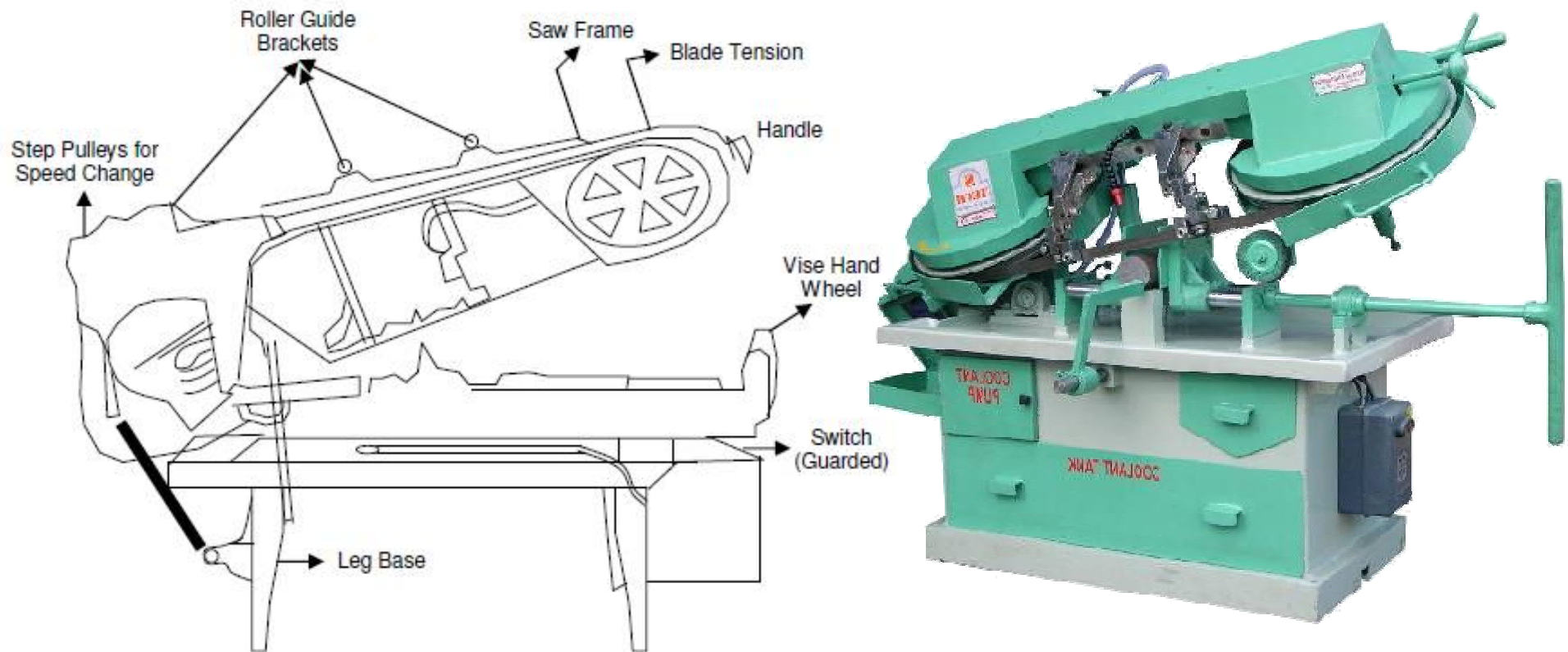


Figure 7.5 : Horizontal Band Saw

CIRCULAR SAW

Cut by means of a revolving disc

- Disc may have large teeth or no teeth

COLD SAW

- Has a circular blade with inserted teeth
- Large diameter blades
- Cuts very rapidly
- Runs at relatively slow speed but very powerful
- Average thickness of cut is 6mm

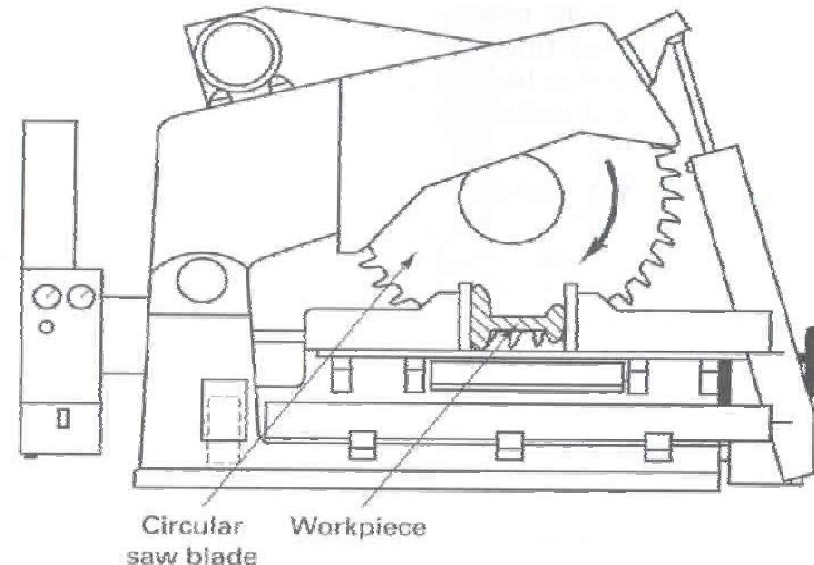
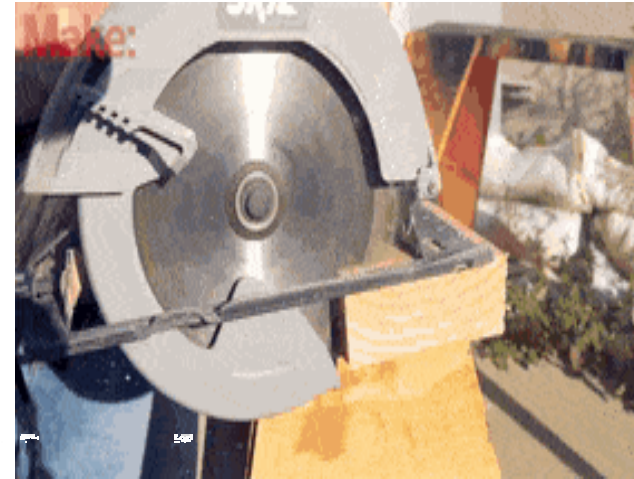
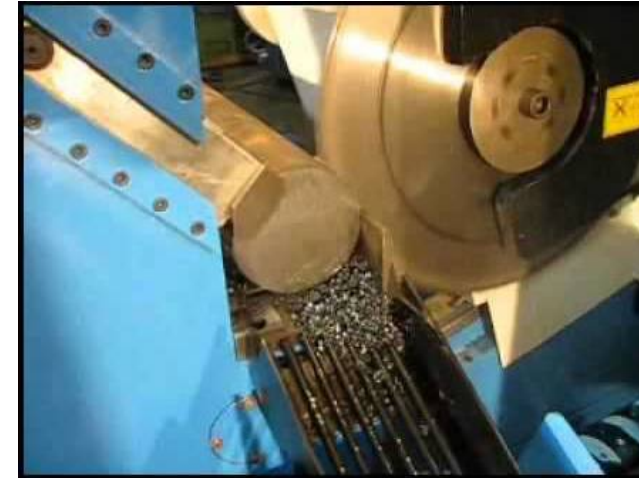


FIGURE 26-25 Circular or cold sawing a structural shape.

CIRCULAR SAW

FRICTION DISCS

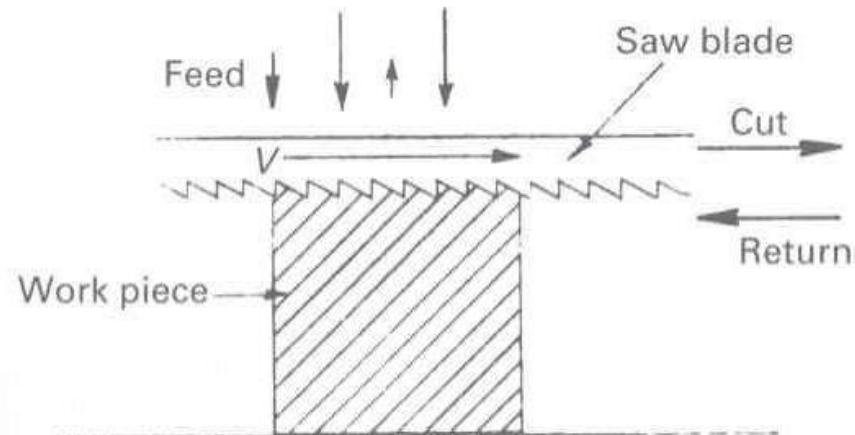
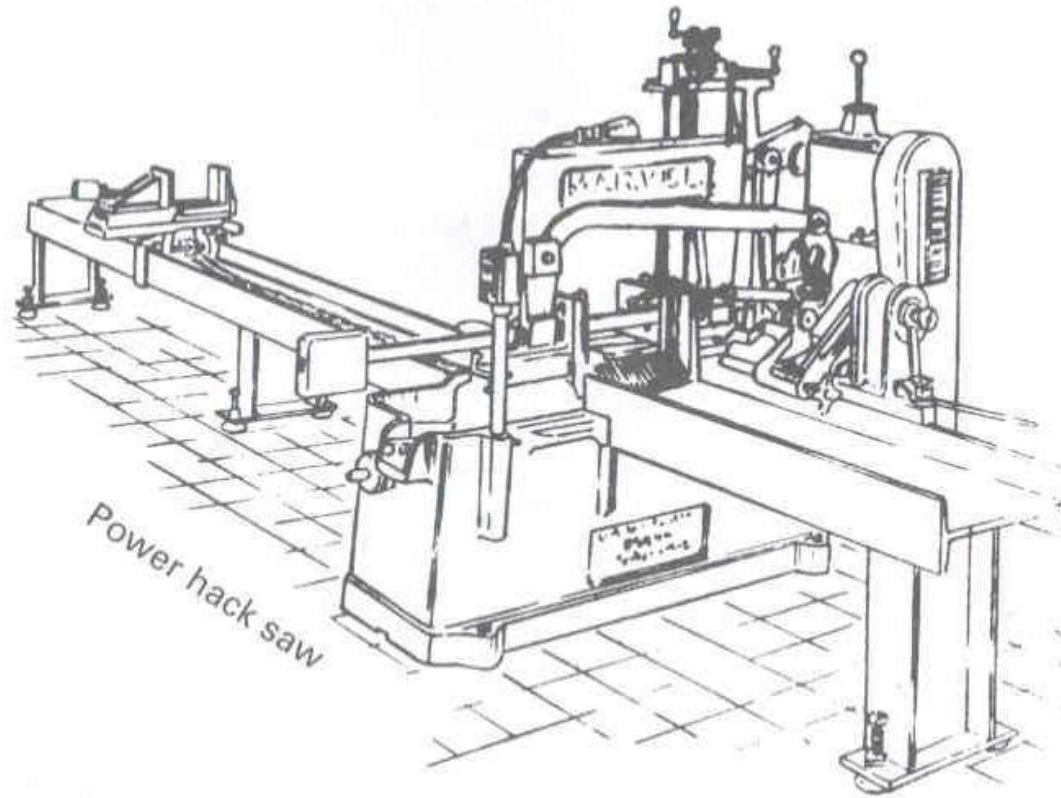
- Circular blades having almost no teeth
- High speed
- Generate heat
- Metal is removed by heat of friction
- Leaves a heavier burr and less accurate surface

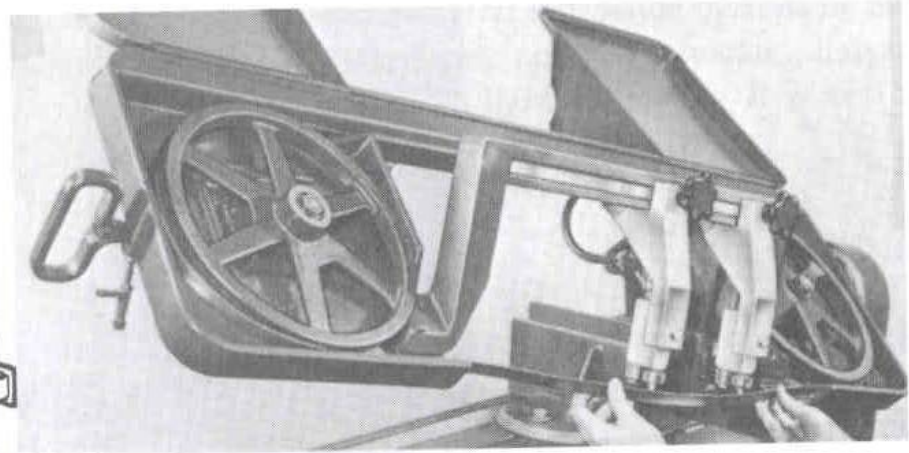
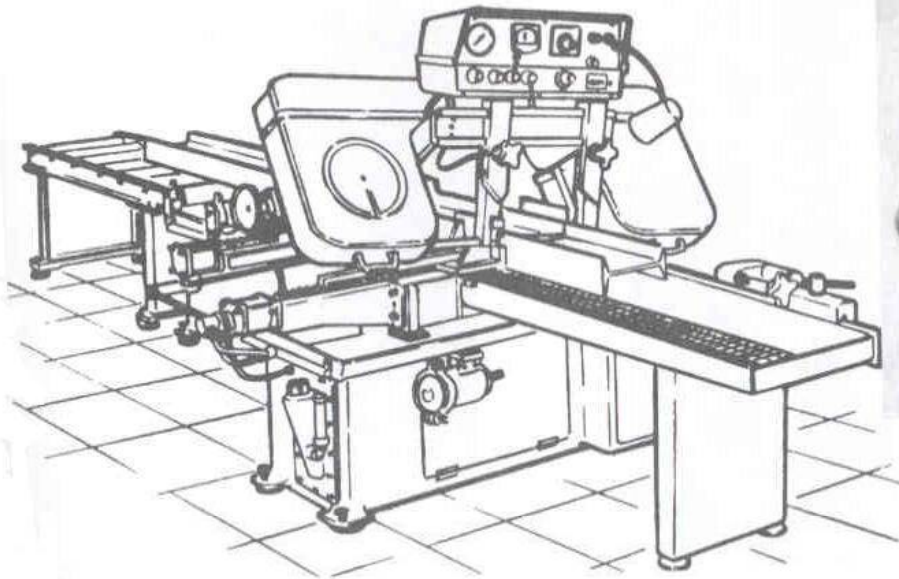


ABRASIVE DISCS

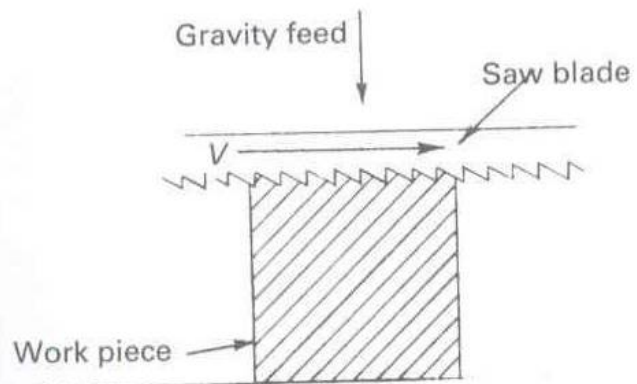
- Rubber bonded wheels rotating at high speeds are used
- Cutting action is fast and accurate







(b)



(a)

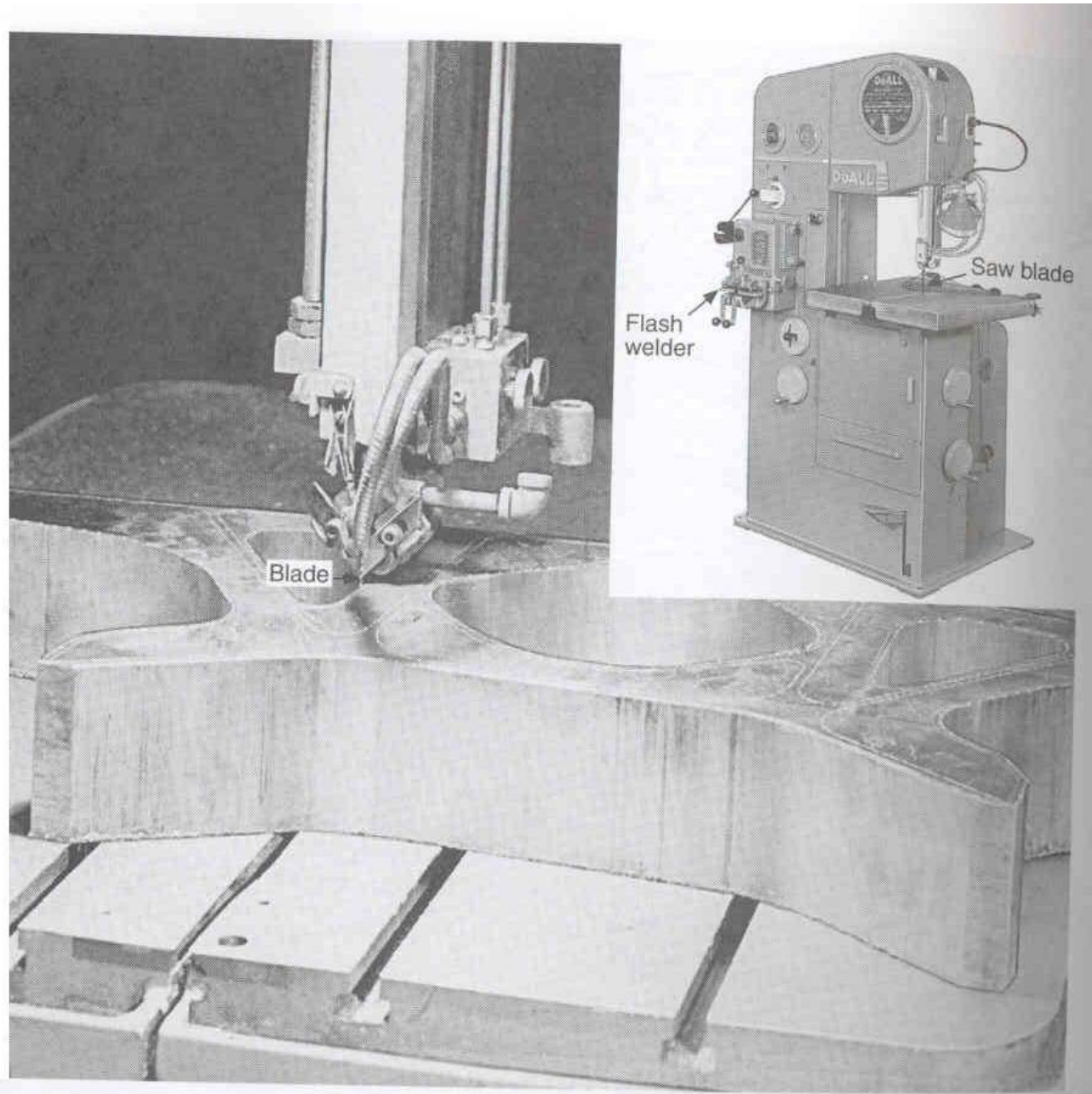


FIGURE 26-24 Contour bandsawing on vertical bandsawing machine. Bandsaw machine shown in inset.

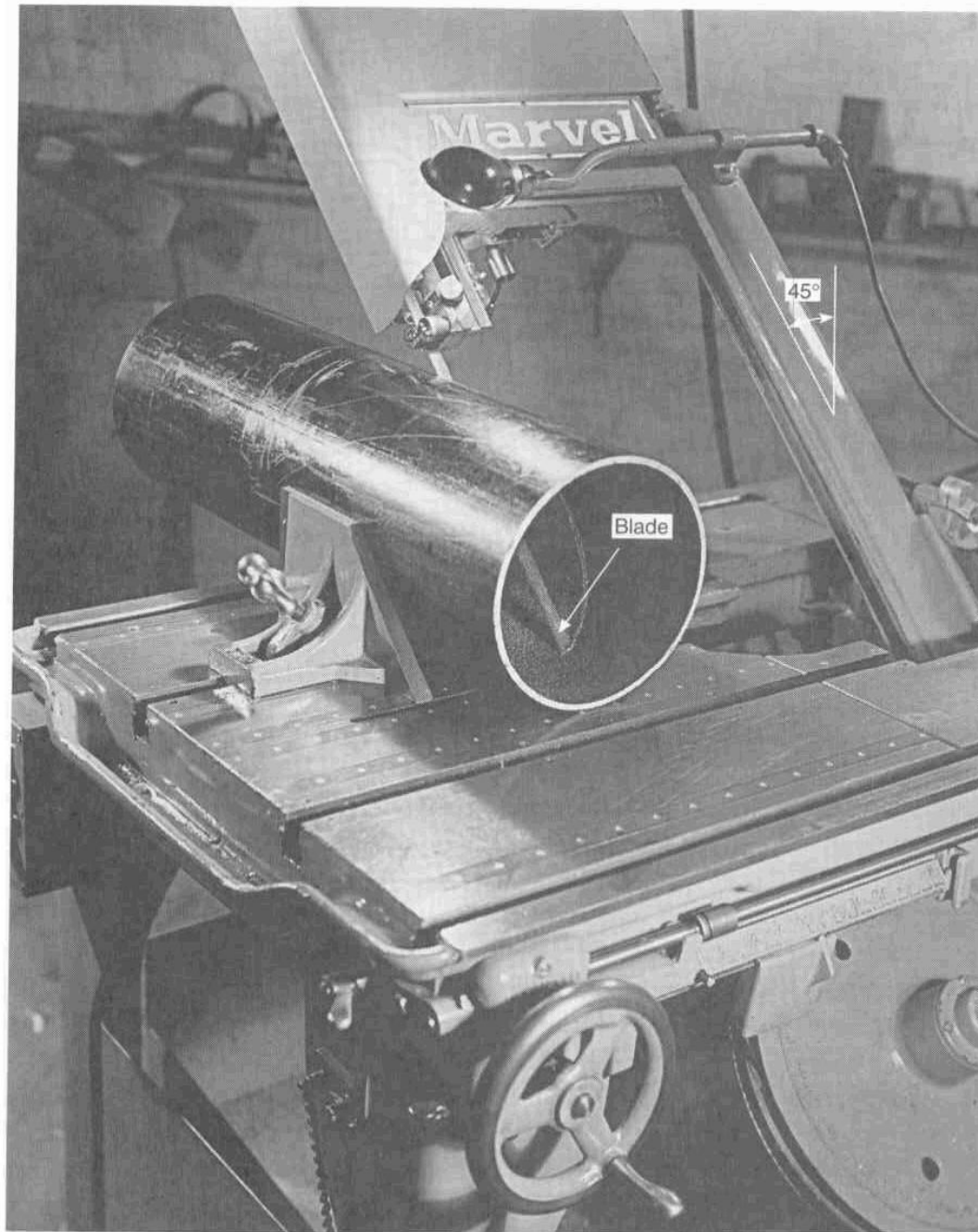


FIGURE 26-22 Cutting a pipe at a 45° angle on an upright cutoff bandsawing machine. (Courtesy of Armstrong-Blum Mfg. Co.)

CONCLUSION

- ✓ Metal sawing cuts the metal into two or more pieces as per the requirement with exact dimensional accuracy
- ✓ It is categorized into different categories depending upon the profile of saw tooth



AMIRAJ
COLLEGE OF ENGINEERING & TECHNOLOGY