

Metal sawing

Sawing is a metal-removing operation.

As with most metal-working operations, we distinguish between manual and machine treatment of the material.

Manual saw types:

- Hacksaw
- Junior hacksaw (small, simple hacksaw)

Machine saw types:

- Power hacksaw machine
- Cross-cut sawing machine
- Ribbon saw machine
- Band saw machine

Hacksaw

A hacksaw consists of a saw frame and handle and the saw blade.



Saw blade

Whatever the saw type, all saws have a saw blade that is harder than the material to be sawn. All saw blades feature a tooth form that can engage with the material, with a sharp angle and sharp points.

Tooth form

The tooth form of the saw blade can have various angles, depending on the material to be sawn.

Regarding tooth form, there are three types of angles:

Rake angle

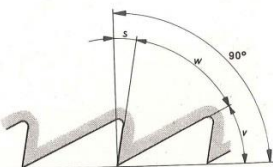
Clearance angle

Wedge angle

The rake angle is responsible for the chip removal – the greater the angle, the easier the chip formation and removal.

The clearance angle ensures that the cutting device behind the cutting edge does not come into contact with the material being cut.

The wedge angle indicates the angle of the tooth and determines the strength of the saw tooth.



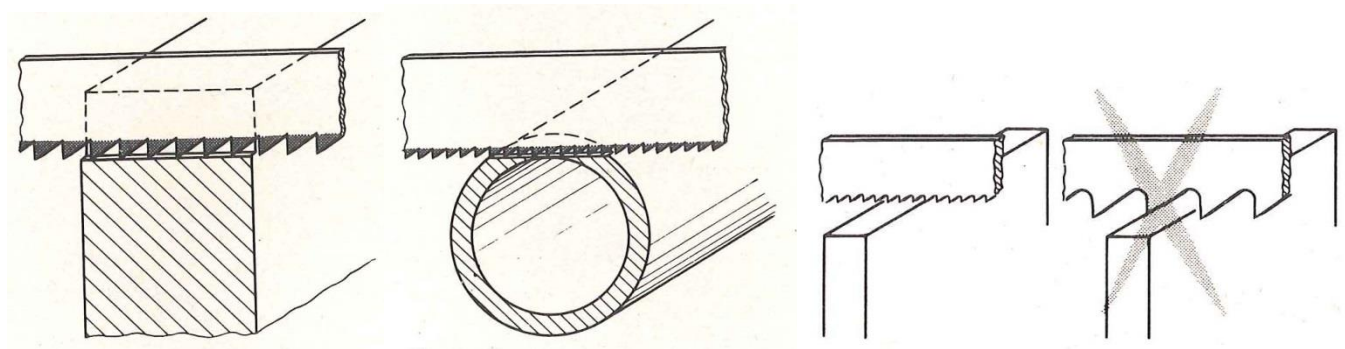
Number of teeth.

The number of teeth on the saw blade to be used depends on:

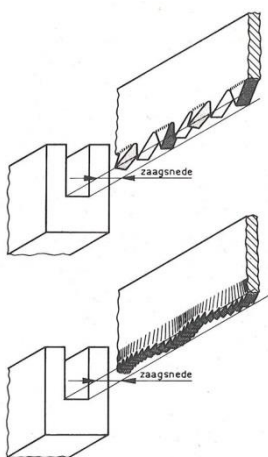
- The material of the workpiece
- The thickness of the workpiece
- The shape of the workpiece

A coarse-toothed saw is used for soft materials and thick workpieces, while a finer-toothed saw is used for harder materials or thin workpieces. You will need a fine-toothed saw for pipes, which are usually thin-walled.

Whichever saw you use, at least three teeth of the saw blade must be in the material at all times. The number of teeth of a saw blade are indicated per inch. A 32-tooth saw blade will therefore have 32 teeth per inch, and is used for hard or thin material. An 18-tooth saw blade has 18 teeth per inch, and is used for soft and thick workpieces.

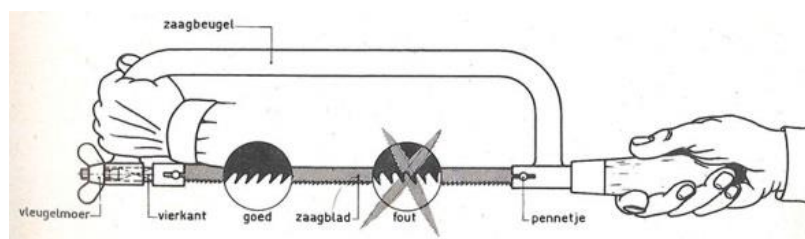


The standard saw blade length for a hacksaw is 12".

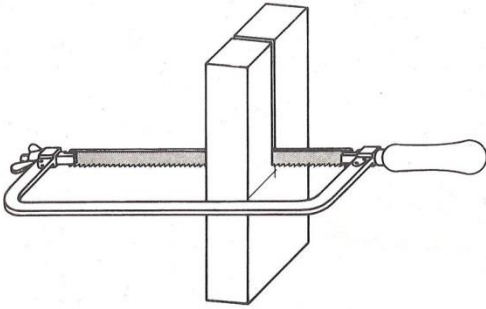


Tooth set

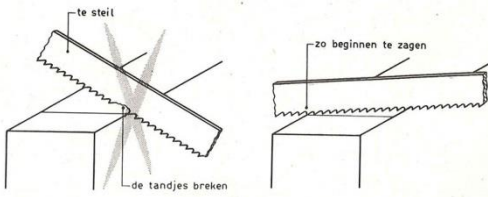
Saw teeth face left and right alternately so that the saw cut is always wider than the width of the saw blade. This ensures that the saw does not get stuck in the material and the chips can be removed from the saw groove. In the case of fine-toothed saws, the teeth are set in a wave set rather than facing outwards, because smaller teeth cannot be bent outwards from the saw blade.



Saws are placed in the frame with the teeth facing forwards and clamped using the tightening screw or handle (depending on the make of the saw frame) so that the saw blade is taut.



To saw off parts that are higher than the saw-frame, most saw-frames allow the saw to be clamped at 90°. However, it will then be necessary to remove and reclamp the saw.

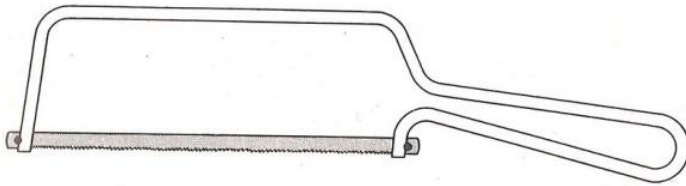


When starting a saw cut, place the saw on the material with the front at a slight downwards angle. This position is the best way to start a good saw cut because at this angle the material will not catch between the teeth.

If the edge of the material catches between the teeth when you point the saw upwards at an angle, there is a considerable risk that the teeth will break.

A junior hacksaw is a small version of the hacksaw. This type of saw is particularly useful for small sawing jobs.

It has a 6" blade and is held taut by the tension of the frame.



Machine sawing

Machine saws were designed to make it easier to saw through thick materials.

A distinction is made between saws that use a reciprocating stroke and saws that use a continuous stroke.

Reciprocating stroke sawing machines

These machines are also known as hacksawing machines.

They imitate manual sawing movements, and consist of a saw-frame, saw and driving mechanism. The reciprocating (forward and return) stroke is obtained using a crank-connecting rod mechanism. The saw blade is considerably thicker than in the case of the manual saw, and the teeth are also coarser.

Unlike the hand saw, the hacksawing machine operates with a pulling saw stroke, with the teeth in the direction of the drive.

These machines are becoming less popular because material is only cut during half of the reciprocal movement of the saw.

Sawing machines with a continuous stroke

Hacksawing machines are being replaced by band saws and circular saws that can be used to remove material continuously and which therefore offer a greater capacity. The band rotation speed can be varied to set the ideal speed for the material type.

Horizontal and vertical band or ribbon saw

A band saw has an endless saw blade which is carried on two band wheels. The centre distance of the wheels can be adjusted to tension the blade.



In the case of a vertical band saw, the saw runs over two wheels that are mounted vertically above each other.

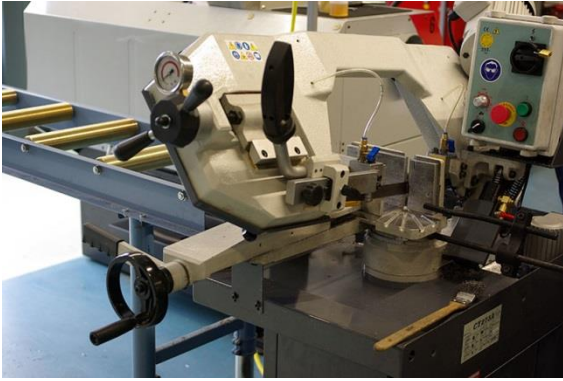
The band saw therefore moves vertically and runs through a support table on which the material to be sawn is placed. The material is pushed against the saw on the support table and held by hand or using an auxiliary tool.

This band saw is suitable for sheet material and can be used (in a very limited way) to cut a shape out of sheet material.

This type of saw may never be used to saw rounded materials, as they will jump on the blade, pulling the hands holding the tube towards the saw.

The surface of the saw to be used can be adjusted for the thickness of the material to be sawn, and should be as small as possible. There is a fixed support for the ribbon saw underneath the guide table, and there is a height-adjustable support above the guide table that is used to create the sawing surface.





With a horizontal band saw, the two guide wheels are set up horizontally at an angle, with the band saw making a horizontal sawing motion.

The material is clamped in a machine clamp and the saw slowly descends through the material, usually pneumatically cushioned.

Cutting oil and a pump are nearly always used with this type of saw.

The cutting support at the front can be adjusted for the width of the material so that the shortest possible sawing surface is used. The closer the supports are together, the less likely the saw is to buckle.



Circular cross-cut saws

Circular saws have a rotating circular saw blade with teeth around the edge.

The saw blade and the drive are fixed to a vertically rotatable arm that is pulled downwards with an arm with a switch. You need to exert pressure on the material yourself by pulling the lever harder or more gently while the saw is running.

Here too, the material to be sawn is clamped in a machine clamp.

The same rules apply for machine and manual sawing:

- At least three saw teeth in the material
- Adjust sawing speed to the material
- Adjust the feed (the movement of the saw through the material) to the material and the length of the saw in the material.

Work carefully – a saw is made of hardened material, and applying the wrong amount of pressure will break it.

