How can I Make a Saw 6 to 10 dBA Quieter?

The information in this document is about making saws quieter. However, it is also an example of what kind of noise reductions are possible in other types of equipment with a little bit of research.

In all types of sawing work, noise has to be taken into account, along with other safety points. When you select a saw blade, you choose how much noise you, and others, will be exposed to - noise that could damage your hearing and make the job unpleasant. The ideas in this section will help you to select the best saw blade for low noise, and should apply to all types of sawing work.

How they make noise

Saw blades do their work through the impact of each tooth on the workpiece. Some saw teeth break off small pieces of the material, as when cutting aluminum; others, like timber rip saws, slice their way through the material.

The force which each saw tooth applies to the material causes fracture of the material, but also causes shock waves to travel through the material and through the blade. These waves, or vibrations, radiate as noise.

Noise: Wasted energy

Some people think a noisy machine must be doing a good job, but in a way it's just wasting energy. The ideal saw blade is one which directs maximum energy into cutting, and very little into vibration and noise. So a quiet blade should also be efficient in cutting. The noise made by a saw blade when cutting depends on a number of factors, including:

- number of teeth - more teeth usually causes less noise, as there is less impact force per tooth;
- size of teeth - smaller teeth also cause less noise, for the same reason; and
- shape of teeth - generally, the saw blade manufacturers have adopted what they think are best all-round tooth profiles for efficient cutting.

Selection Rule No.1 - Choose a saw blade with the greatest number of teeth, of the smallest width, suitable for the job. Choosing a blade with 108 teeth rather than 84 teeth can be a 6 dB reduction! Would you rather buy the quitter blade once or hand out hearing protection for the next 20 years? Guess which approach is less expensive.

Blade vibration control

In many cutting processes, vibration of the saw blade is a major noise source - even when you have followed Rule 1 and selected a blade with the largest numbers of small teeth. If you strike a saw blade, it will 'ring' like a bell, because of its elastic properties. In the same way, each tooth striking the workpiece will cause the saw blade to 'Ring'. The amount of

ringing depends on the vibration "damping" of the saw blade. If you put your hand on a ringing bell, the sound stops, because you have 'damped' the vibration.

Some good saw blades have vibration "damping" built in. This may be in the form of slots cut into the body of the saw blade (to stop vibration energy running around the blade). Note that the normal expansion slots which are cut into tungsten carbide tipped blades do not go deep enough to eliminate vibration.

Another form of vibration damping is an internal damping layer built into the blade. You can tell whether a blade has any built-in vibration damping by tapping it - a well damped blade will respond with a dull 'tick', rather than a 'ting'.

Selection Rule No.2 - Choose a saw blade with built-in vibration damping.

Air noise

When free running or idling, a saw blade can still make a lot of noise. This aerodynamic noise is caused by pockets of air being trapped in the saw gullets (the gaps between the teeth). As these pockets of air speed past the still air - often at speeds of over 200 km/h - the shearing effect of air against air creates noise. The larger the gullet size, the more noise is created.

Selection Rule No.3 - Choose a saw blade with gullets as small as possible, while still allowing for removal of material.

Using the saw blade

Here are some good general pointers for keeping your saw blade noise at the lowest level:

- sharpen the blade regularly - blunt or chipped teeth reduce cutting efficiency and increase noise;
- ensure side to side runout ('wobbling') is small, when attaching the blade;
- keep the saw machine itself in good order through regular maintenance of bearings, belts etc.; and
- select a running speed that gives least noise (a high speed causes more air noise but often gives less cutting noise).

What the tests show

Sound level tests* on different saw blades under comparable conditions, show that these three Selection Rules really do make a difference. Here are some examples:

	Sound level dB(A) at operator position
Tooth number and size	
Cutting lengths of aluminum	
- 350mm dia. TCT blade, 84 teeth, 3.5mm wide	97
- 350mm dia. TCT blade, 108 teeth, 3.2mm wide	91
Reduction, dB(A)	6
Vibration damping	
Cutting bricks	
- 350mm dia. 'standard' masonry blade, 20 teeth	94
- 350mm dia. 'damped' masonry blade, 20 teeth	84
Reduction, dB(A)	10
Air noise	
'Dummy cut' (run up to 3400 rpm, run down), without cutting	
- 350mm dia. TCT blade, 84 gullets, 10mm x 7mm	91
- 350mm dia. TCT blade, 108 gullets, 8mm x 4mm	84
Reduction, dB(A)	7

Remember

There are three rules for selecting a saw blade:
- Choose a saw blade with the greatest number of teeth, of the smallest width, suitable for the job.
- Choose a saw blade with vibration damping built in.
- Choose a saw blade with gullets as small as possible, while still allowing for removal of material.

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