

Noise reduction at band re-saws

HSE information sheet

Woodworking Information Sheet No 4

Introduction

This revised information sheet is one of a series prepared by HSE's Manufacturing Sector in agreement with the Woodworking Machinery Suppliers Association. It provides guidance for employers on how noise from band re-saws is generated and how to reduce it at source using engineering controls. It then explains how to build a noise-reducing enclosure. See Woodworking Information Sheet WIS13 for more detailed information on noise.

The Control of Noise at Work Regulations 2005 require employers to eliminate risks from noise, and, where this is not possible, to reduce them to as low as is reasonably practicable. There are two action levels in the Regulations (which are measured in decibels (dB)) – a lower exposure action value of 80 dB and an upper exposure action value of 85 dB. There is a risk of hearing damage where daily personal exposures to noise are at or above 80 dB.

Band re-saws are widely used in the wood industry. Without any measures to reduce noise at source, they can produce noise levels of over 85 dB (typically 100 dB at the operator position). At this level of noise, an employee's daily personal noise exposure would reach the 85 dB upper action value after 15 minutes. The best way to deal with the problem is to reduce machinery noise at source, eg by providing a noise enclosure, and also to organise your workplace so that fewer employees are at risk.

Noise from band re-saws

Machine noise can be reduced, particularly when the machine is idling, by maintaining the machine and blade in good condition. Well-maintained machines with pulley diameters up to 900 mm produce idling levels in the region 80 to 90 dB. Poorly maintained machines, which are otherwise identical, may idle at levels as high as 110 dB.

Cutting noise is typically between 95 and 105 dB. Machines that are cutting for any substantial part of a working day will usually need to be enclosed where practicable.

Main source of noise

When a band re-saw is idling, vibration of the blade is usually the main source of noise. When cutting, high vibration levels in the blade caused by sawdust trapped between the pulleys and blade, and vibration of the timber being sawn are the main noise sources. How much the blade vibrates is affected by the:

- gauge of the blade;
- condition of the saw pulley surfaces;
- effectiveness of the sawdust deflection and extraction systems;
- effectiveness of the pulley and blade scrapers/cleaners;
- effectiveness of the sawblade lubrication system;
- adjustment of the saw guides; and
- blade tension.

The condition of the sawblade and the smoothness of the pulley faces have been found to affect idling noise levels by as much as 10 dB. How efficient the sawdust extraction and wheel scraping/cleaning systems are can have a similar effect.

Poorly adjusted saw guides can push noise levels up by 3 dB and using an unnecessarily heavy-gauge sawblade produces a wider kerf (cut) and can also produce more noise. A new 19 gauge 100 mm blade running on 900 mm diameter pulleys has been found to produce levels 5 dB higher than a new 20 gauge blade on the same machine.

Indicators of machine and blade condition

The difference in noise when cutting and when idling is a good indicator of the condition and adjustment of the machine and blade. On a well-maintained machine, when sawing starts the noise level should rise instantaneously by about 10 dB (sounding perhaps twice as loud) above the idling level and as the timber clears the saw, the noise should rapidly return to the idling level.

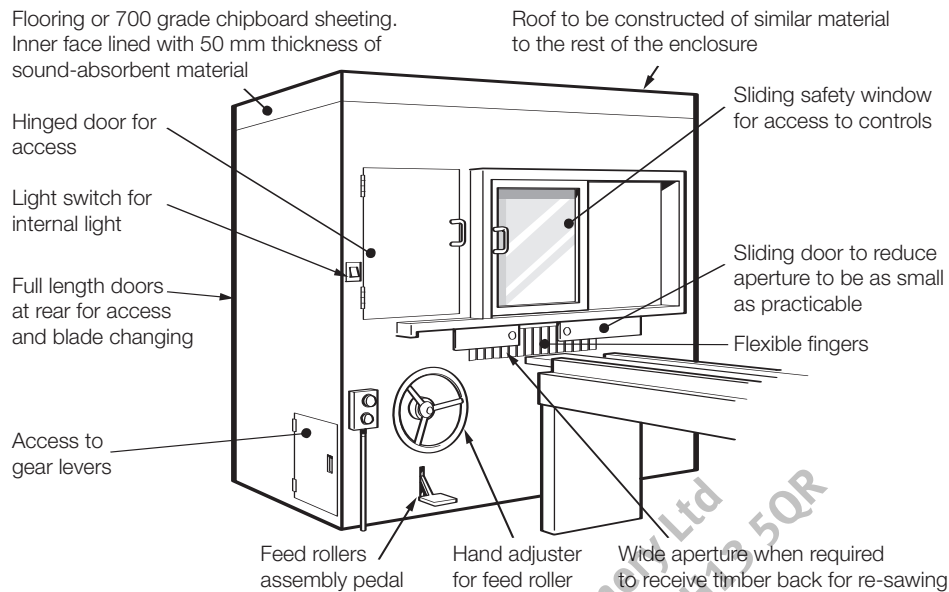


Figure 1 Band re-saw noise enclosure

If the noise level falls slowly to the idling level or if there is no noticeable difference between cutting and idling, then the pulley scrapers, lubricating felt pads or sawdust extraction system need attention.

A high idling noise with very little difference between idling noise and sawing noise indicates that the surface of the blade or the pulleys are in poor condition or contaminated with resin and sawdust. The blade surface can have lumps, hollows or hammer marks resulting from abuse or from poor saw doctoring. Resin and sawdust (particularly from timbers such as redwood) can stick to pulley faces and the uneven surface causes the blade to vibrate.

Replace sawblades in poor condition and regrind badly-worn pulley faces. Scrape clean contaminated blades and pulley faces and maintain them in this condition by adjusting the scrapers and the lubrication system.

Experience with a typical machine

Tests were carried out on a typical 1200 mm re-saw in a small mill and noise levels were measured at the in-feed operator's position.

Before adjustment, the idling noise level was 103 dB and the noise produced by sawing imported redwood was 103 dB. After fitting new pulley scrapers, new felt pads to the cleaner/lubrication system and correctly adjusting the guides, the idling noise level was 88 dB and the noise from sawing imported redwood was 100 dB.

For a small outlay on parts and about two hours fitting time, the idling noise was reduced by 15 dB and the cutting noise by 3 dB.

Noise enclosures

Providing a noise enclosure for band re-saws is a 'reasonably practicable' way to reduce the noise exposure of operators. As well as reducing noise, enclosures control sawdust, illuminate the cutting area (when fitted with lighting), and act as a barrier reducing the risk of operators contacting the sawblade by accident.

Effective noise enclosures for band re-saws may be constructed from a variety of materials. 'Home-made' enclosures can be as efficient as commercially-supplied models and may cost much less. A well-constructed enclosure can reduce noise by 10-15 dB. They should be built on a timber frame (minimum 50 mm x 50 mm studding). The outer skin (cladding) should have good noise-reducing properties, eg use high-density 19 mm chipboard or plywood.

Internal surfaces

The internal surfaces of the enclosure should be lined with a sound-absorbent material, eg mineral wool slabs with a density of 60 kg/m³ and a thickness of 50 mm. This should be covered with thin polythene sheeting (less than 0.1 mm thick) to keep out dust. The absorbent material should be held in place by perforated metal or hardboard with at least 30% open area.

Feed and delivery

Feed and delivery openings should be as small as possible. Where a wide range of timber sizes are processed, the aperture size may need to be adjustable, but in any case restricted so that the maximum cross-section of timber the machine will process is not affected. Apertures should be fitted with a double row of overlapping rubber or loaded PVC flaps or fingers, each about 18 mm wide. This will allow the workpiece to pass through while creating the minimum possible gap through which noise can leak.

Access doors

Access doors should allow blade changing, machine maintenance and adjustments. Doors should be of double-skin 12 mm chipboard or plywood and built on a 25 mm timber framework. They should be rebated and self-closing (eg by using rising butt hinges). All gaps around the door should be fitted with soft rubber sealing strips. Robust catches or locks should be fitted to hold the door firmly closed against the sealing strips.

Viewing panels

Viewing panels should be acoustically sealed into the structure. Safety glass 6 mm thick is usually adequate, although double-glazing is preferable and sometimes necessary. Experiment with access and viewing panel positions before completing the enclosure.

Ventilation

Air-cooled equipment inside the enclosure should be adequately ventilated. You will need to acoustically lag and/or line parts of the ventilation and the dust extraction duct work as these are likely to become sources of noise breakout.

Machine controls

Some of the machine controls, such as the feed roller pedal and control wheel, should be extended so that they can be operated from outside the enclosure. The feed stop and start and emergency stop controls should also be outside the enclosure.

Joints

All joints between the enclosure walls, roof, floor, doors, extraction ducts and glazing need to be properly sealed. Expanding foam, soft pliable substrates, putties and silicone etc can be used.

Frequently asked questions on enclosures

Is it realistic to think about enclosing machines in 'green' saw mills where irregular logs are fed?

Where two flat faces have been cut and timber is fed against a fence, this is possible.

What about frequent changing and adjusting of the saw blade?

Every enclosure can be designed to have good access doors for this purpose.

Would an enclosure prevent passing back of timber?
Some mills have made a passing-back tunnel through the enclosure, or separated the feed area from the pass-back area by a partition. Others have increased productivity by off-loading onto a trolley and passing back a batch of timber at a time to be re-sawn.

Could enclosure of the top pulley prevent checking of blade tracking and lead to accidents?

Blade tracking can be checked against a mark on the table. Internal lighting and a band-tracking window will help. Some machines are supplied with band-tracking indicators.

What about running adjustments – wouldn't these require continual opening of the enclosure?

Controls can be extended to operate outside the enclosure. The fine fence control can be set electronically.

What about short-length work and angle cutting of firrings? Would the enclosure get in the way?

These problems can be overcome by careful design:

- by recessing or inclining the windows above the feed and take-off apertures;
- by providing foot recesses to enable the operator to stand close to the enclosure wall; and
- by providing apertures of a suitable size and by using firing jigs.

Alternatively the butting of short lengths can sometimes be avoided by cross-cutting after re-sawing rather than before.

How will the sawyer hear the blade 'clicking' and anticipate serious problems?

The enclosure will reduce the sound level of the 'clicking' and the noise produced by the rest of the machine by about the same amount. The clicking will therefore still be heard.

Further reading

1 *Controlling noise at work. The Control of Noise at Work Regulations 2005. Guidance on Regulations* L108 (Second edition) HSE Books 2005 ISBN 978 0 7176 6164 0

2 *Noise at work: Guidance for employers on the Control of Noise at Work Regulations 2005* Leaflet INDG362(rev1) HSE Books 2005 (single copy free or priced packs of 10 ISBN 978 0 7176 6165 7) www.hse.gov.uk/pubns/indg362.pdf

3 *Noise at woodworking machines* Woodworking Information Sheet WIS13(rev1) HSE Books 2007

Further information

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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