



Control of noise at metal-cutting saws

Engineering Information Sheet No 27

Introduction

This information sheet provides guidance to assist machine users and manufacturers/suppliers in reducing employees' noise exposure when using metal-cutting saws. Users may need some specialist assistance in retrofitting noise control measures to existing machines. This guidance should be read in conjunction with Engineering Information Sheet No 26¹ which gives further background information.

The problem

Metal-cutting circular saws, particularly those operating at high speeds, cutting non-ferrous material such as aluminium, are known to produce high noise levels. These noise levels can typically exceed 100 dB(A).

High-speed, pivoting head and up-stroking saws, for example, are commonly used for high volume cut-to-length and mitre-cutting operations. These machines process a wide variety of bar, strip and extruded materials. Less commonly, they are also used to cut lighter steel sections.

A free-running saw can also produce noise levels of around 90-95 dB(A). These periods of free running can have a significant impact on the daily noise exposure of the saw operator and those in its immediate vicinity.

Sources of noise

Noise from circular saws can come from a number of sources including:

- free-running noise generally associated with the aerodynamic disturbance in the vicinity of the blade (producing a hissing sound). When this frequency coincides with the blade resonance frequency, it gets amplified and produces a high-intensity scream or whistle;
- cutting noise due to the impact between the saw blade and the work-piece and radiated by both;
- blade and work-piece vibration noise (sometimes at resonance, producing a ringing noise) which also depends on the feed rate of the cut.

Duties of manufacturers and suppliers

The Supply of Machinery (Safety) Regulations 1992 (as amended) require suppliers (who may or may not also be the manufacturers) to take measures to reduce risks from noise.

Control of noise at source by engineering means is the required option if the means are available and is generally best achieved at the design stage by careful consideration of the noise-generating mechanisms. A number of manufacturers already supply machines provided with full acoustic enclosures (usually fully automatic machines).

Manufacturers/suppliers are also required to supply data on noise emissions, measured according to relevant standards and an appropriate test code.

Duties of machine users

The Noise at Work Regulations 1989 require employers using noisy equipment or processes in their businesses to adopt measures to prevent their employees suffering hearing damage.² Regulation 6 requires the risk of hearing damage to be reduced to the lowest level reasonably practicable. If the noise levels exceed a daily personal exposure level of 90 dB(A), reduction of the risk has to be achieved by means other than the use of ear protectors. In other words, businesses using metal-cutting saws should adopt the kind of engineering controls described in this information sheet, or other suitable measures, where it is reasonably practicable to do so.

Purchasing new machines

Purchasers should use manufacturers' noise data to select quieter machines from the outset. It is also helpful to seek further recommendations, from the manufacturer, on any additional noise control measures that should be applied under the intended installation and operating conditions. Further advice can be found in HSE leaflet *Keep the noise down*.³

Engineering controls

For existing saws, where reasonably practicable, steps should also be taken to reduce noise at source. Practical methods of noise reduction need to be considered as part of the noise assessment required by the Noise at Work Regulations.^{1,2}

By careful measurement of the noise levels at each stage of the machining cycle, eg loading, idling, cutting etc, the dominant noise sources can be identified. This information can then be used to help select the most appropriate noise reduction techniques. All of the methods outlined overleaf may contribute to reductions in workers' noise exposure and some may need to be used in conjunction.

Some practical methods of noise reduction

- Select the correct saw blades for the intended operation.
- Keep the blade sharp to maintain optimum cutting performance.
- Provide correct clamping of the work-piece to reduce radiated noise. Additional clamping arrangements may be used, such as suitably positioned toggle clamps. Pads fitted to the clamps damp vibration transmission and prevent damage to work-surface finish.
- Reduce radial and lateral imbalance possibly due to worn bearings, imbalance in saw blade or its associated arbour collar, inadequate maintenance or excessive duty cycles on a machine not designed for the service conditions.
- Use damped saw blades (seek saw manufacturer's advice).
- Use noise/vibration absorbing material on the surface of the feed table.
- Damp the machine subframe or panels using proprietary damping compounds.
- Enclose or partly enclose the cutting area using suitable sound-absorbing material.
- Switch the saw off when not required.
- Locate the saw in a separate room, to limit the noise exposure of other workers.

Damping the saw blade

Damped blades can significantly reduce noise, especially from those blades which exhibit 'resonance' while idling. Various methods of damping have been tried with varying degrees of success. These include laminated blades, damping discs or plates and resin-filled, laser-cut slots in the blade (elongated 'S' shape). On a pendulum cross-cut saw, for example, a suitable foam can be added inside the existing top guard to absorb sound and at the same time produce a damping effect on the saw blade.

The overall noise reduction achievable in specific cases using these methods is difficult to predict but treatment has reduced the noise of some typical operations by up to 6 dB(A). Treatment may be applied to new blades and to used blades sent for refurbishment.

Maintenance

The control measures applied to reduce noise should be subject to periodic inspection and necessary maintenance to ensure that they continue to be effective.

Training

The Noise at Work Regulations² require employers to give appropriate information, instruction and training to employees. This will include information on noise control measures fitted to saws and on how such controls are to be used and, where appropriate, maintained. The noise assessment should identify the specific matters which need to be covered.

References

- 1 Noise in engineering EIS26 HSE Books 1998 (Free leaflet)
- 2 The Noise at Work Regulations: a brief guide to the requirements for controlling noise at work INDG75 (rev) (single copies free; ISBN 0 7176 0961 8 for priced packs of 15 copies)
- 3 Keep the noise down INDG 263 HSE Books 1997 (single copies free; ISBN 0 7176 1480 8 for priced packs of 15 copies)

Further information

Sound solutions: techniques to reduce noise at work HSG 138 HSE Books 1995 ISBN 0 7176 0791 7

Health and safety in engineering workshops HSG 129 HSE Books 1995 ISBN 0 7176 0880 8

Health surveillance in noisy industries INDG193 (single copies free; ISBN 0 7176 0933 2 for priced pack of 10 copies)

Ear protection in noisy firms: employers' duties explained INDG 200 (single copies free; ISBN 0 7176 0924 3 for priced packs of 20 copies)

Reducing noise at work: guidance on the Noise at Work Regulations 1989 L108 HSE Books 1998 ISBN 0 7176 1511 1 (due for publication at the end of May 1998)

The future availability and accuracy of the references listed in this publication cannot be guaranteed.

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