LEV Standards Coalition

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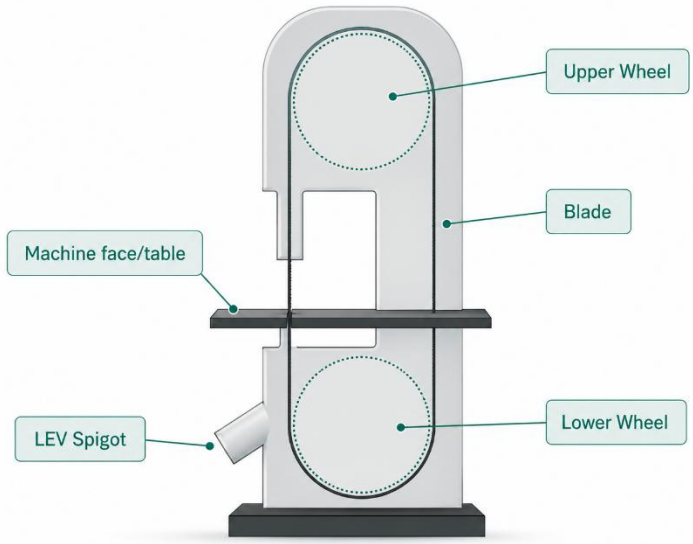
Narrow Bandsaws

Sources of dust generation and LEV

What is a bandsaw

A bandsaw is a machine which houses a saw blade. It is characterised by its narrow, continuous steel blade with teeth on one edge, which runs over two or more wheels to create a continuous cutting motion. This machine is highly valued in woodworking for its ability to make intricate cuts, curves, and resawing.



What does the HSE say about Bandsaws

Follow this link to the HSE's dedicated page on Bandsaws: Introduction to woodcutting machinery - Narrow band saw (hse.gov.uk)

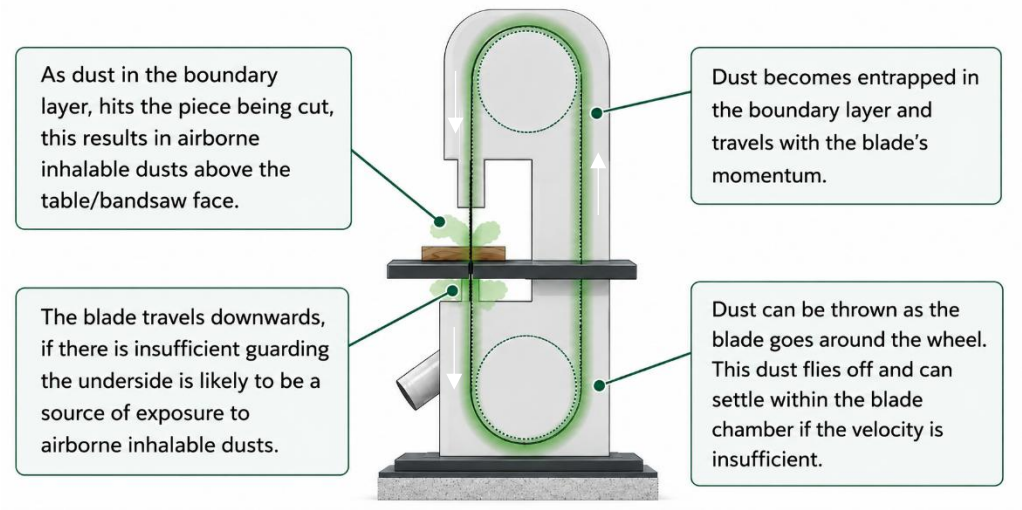
- The HSE have a video on the safety of bandsaws which you can direct your clients too or download (link). They also have some good tips on the general safety of bandsaws. Mainly aimed at guarding.
- Information sheet WIS31 (link).
- COSHH essentials for woodworkers WD1 (link).

The HSE state:

"Wood dust Narrow band saws should be fitted with effective local exhaust ventilation to control wood dust. To capture the dust effectively collect it where the saw blade enters the casing, and by means of a low-level exhaust connection to the rear of the casing.6 Suitable Respiratory Protective Equipment (RPE) with a UK Standard Assigned Protection Factor (APF) of at least 20 will normally be required during operation, maintenance and cleaning ."

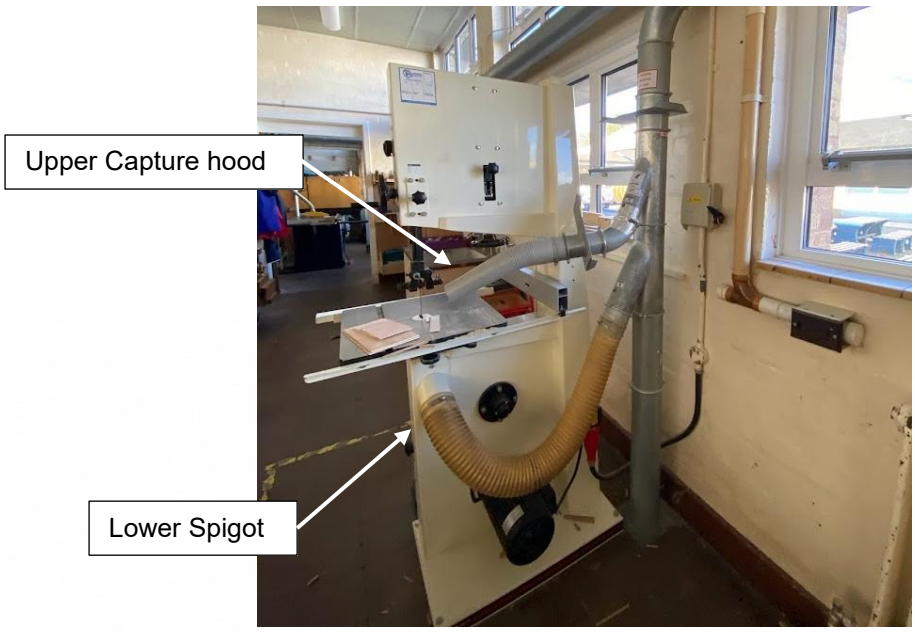
What are the sources of dust?

- The blade at the point of cutting.
- Under the machine face/cutting table
- Dust which travels with the blade (boundary layer)
- Vibration of settled dust on the machine face.



What hoods are required?

- Bandsaws normally come with a spigot (sometimes multiple spigots). This extracts from the blade chamber. This is designed to take away the boundary layer dusts.
- We want downward extraction at the slot at the machine face/cutting table. To take away directional dusts. This is dependent upon the machine having sufficient guarding under the face.
- A capture hood for the top of the machine face/table.



Looking inside a Bandsaws Blade Chamber:

How do we ascertain if control is effective?

Quantitative

- **Duct Velocity.** We record Static pressure and velocity in the duct. We are looking for a minimum duct velocity of **15m/s** in the duct for conveying **fine wood dust**. *(Ref: Table 12 of HSG258)*
- **Slot Velocity.** Using a hot wire, we place it over the slot on around the blade which is located on the working table face. I take at least 3 readings. These readings are not entirely accurate, since the probe itself blocks part of the slot face, so the results should be considered indicative rather than precise. This is to see if we have any velocity at the face. Which will be achieved with appropriate blade guarding under the machine face.
    - Note that the volume here won't match the volumetric flowrate at the duct. This is because there are lots of places where air leaks in on a bandsaw, they are normally very poorly sealed.
    - This is a receiving hood. A receiving hood is placed where the contaminant is already moving and can be "received" into the hood. In this example the blade pulls the dust down into the slot, which is the point of extraction.
    - From experience on Tyndall assessments. At least 1m/s slot velocity coupled with a duct velocity of >15m/s often results in satisfactory Tyndall assessments.

- **Capture Velocity** *(if fitted with an upper hood).* Using a hotwire, we take multiple readings across the face of the capture hood.

Qualitative

- Visuals.
    - Is there any evidence of any uncontrolled dust around the face or on the floor, around the bandsaw?
    - Follow isolation procedures to ensure the unit cannot be powered. Open the bandsaw, is the blade chamber clean? A build up of dust here can present a fire risk – the friction produced at the blade could be a source of ignition.
    - Check under the machine face. Is there blade guarding underneath and is it properly set in position?
    - Does the capture hood *(if fitted)* reach the blade?
    - Is the duct and hose in good physical condition? i.e. free from damage, rips and holes.
    - Are capture hoods useable? Do they hold themselves in position correctly?

- Tyndall. Ask your client to perform a test cut, whilst you assess with a Tyndall. The Tyndall needs to be conducted both above and below the face.
    - Dusty machine face. The vibration from the machine will disturb the settled dust and will show fugitive emissions in your Tyndall Assessment. This should be cleaned prior to conducting your Tyndall Assessment.
    - Insufficient duct and slot velocities are likely to fail to capture the dusts at source and within the blade chamber. Some of the dust will be pulled around with the boundary layer and will be illuminated under Tyndall above the point of cutting.

Access to the blade chamber and guarding

The blade chamber and any enclosed areas forming part of the LEV system should not be accessible while the bandsaw is in operation where this would expose dangerous moving parts. Access panels, doors or casings should therefore be secured in a manner that prevents inadvertent or unauthorised opening during use.

Where opening the casing could expose the operator or others to danger, simple hand-operated catches or turn handles may not provide sufficient protection. In such cases, access should be controlled by suitable locking or interlocking arrangements, or by effective isolation procedures, in line with the requirements of PUWER and the principles of preventing foreseeable misuse.

Respiratory Protective Equipment (RPE)

The primary purpose of the engineering controls described in this factsheet is to reduce exposure to wood dust at source, in accordance with the hierarchy of control. However, the presence of effective LEV does not automatically remove the need for additional controls.

The requirement for Respiratory Protective Equipment (RPE) should be determined by a suitable and sufficient risk assessment carried out in accordance with COSHH Regulation 6. This assessment should take account of the effectiveness of the engineering controls (including LEV performance and examination under COSHH Regulation 9), the nature and duration of the work, and the potential for residual exposure, including during high-dust-generating activities, maintenance, cleaning, and non-routine tasks.

Where necessary, personal exposure monitoring in accordance with COSHH Regulation 10 may be required to confirm whether exposure is adequately controlled. The outcomes of the risk assessment and any monitoring should inform the selection, specification, and use of RPE, including the required level of protection.

This factsheet does not specify RPE requirements, as these will vary depending on the substance, workplace conditions and exposure profiles. Employers should ensure that any RPE provided is appropriate, properly selected, used, and managed in accordance with COSHH and HSE guidance, and that advice is obtained from a competent person where required. Some HSE factsheets such as WD1 for wood dust do specify a minimum Assigned Protection Factor (APF) of 20.

Conclusions

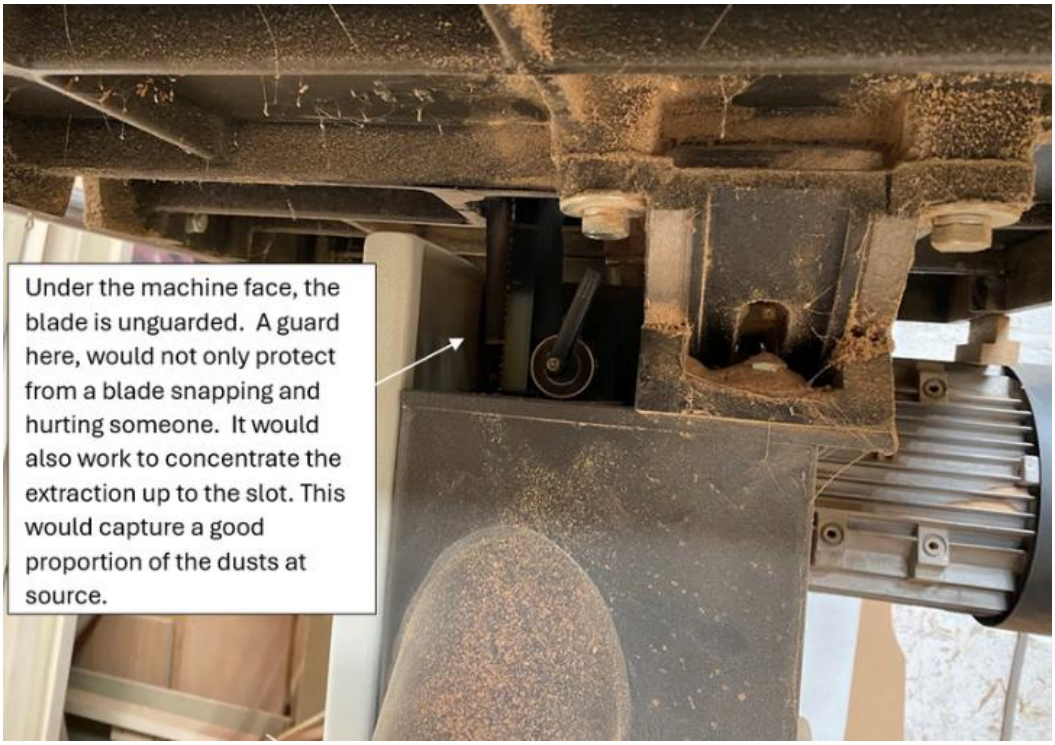
The effectiveness of dust control on narrow bandsaws must be judged by combining both quantitative data (duct and slot velocity measurements, capture velocity checks) and qualitative evidence (visual inspection and Tyndall testing).

Where duct velocities exceed 15 m/s and slot velocities reach at least 1 m/s, experience shows that satisfactory control of dust can usually be achieved, provided the hoods are correctly positioned and the machine is in good physical condition. Qualitative assessments, such as signs of settled dust, chamber cleanliness, and Tyndall smoke testing above and below the cutting face, provide further confirmation of control effectiveness.

By integrating these findings, we can give the client clear recommendations on whether the current LEV system provides adequate protection or requires improvement. The ultimate aim is to ensure that wood dust exposure is reduced to a level that is As Low As Reasonably Practicable (ALARP), in line with HSG258 and HSE guidance.

Some examples of good and bad engineering control

Example 1 BAD:

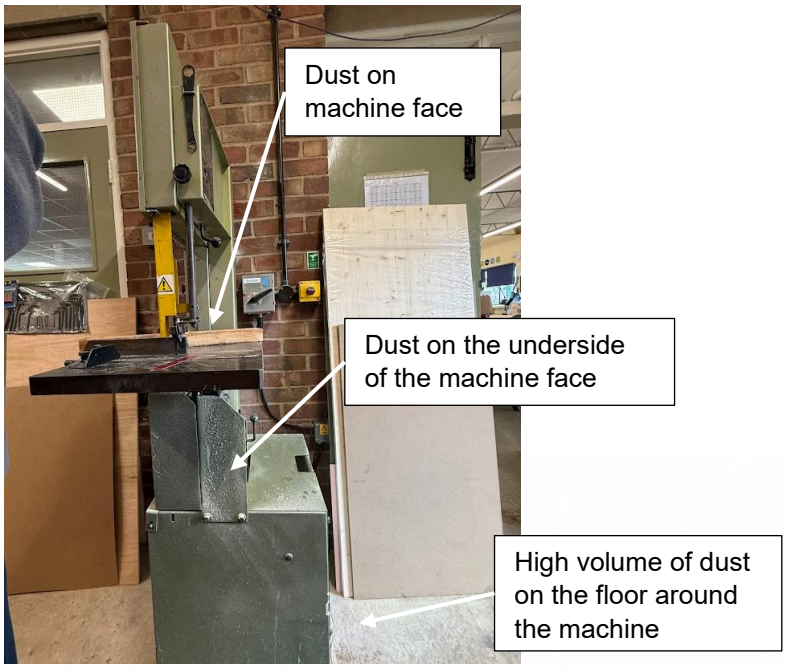


Example 2 BAD & GOOD:

The fan inside the filter unit was found to be running in reverse. This resulted in insufficient duct transport velocities, which were not taking away the dust from the blade chamber. The phases were changed to correct the motors direction. Test cuts under Tyndall light then demonstrated satisfactory control.

Example 3 BAD:

This is a bandsaw with no Local Exhaust Ventilation (LEV).



Example 4 BAD:

Insufficient guarding in between the enclosed blade chamber and the slot where the cutting (point of dust generation). This resulted in insufficient slot velocity and insufficient control of the generated dusts.

Example 5 GOOD:

Correct damper usage. Correct usage observed. Good transport velocities. Under table blade guard. Clean blade chamber and a slot velocity of >3m/s.

References

- L5. The Control of Substances Hazardous to Health Regulations 2002 (as amended) Approved Code of Practice and guidance. https://www.hse.gov.uk/pubns/priced/l5.pdf
- HSG258. Controlling airborne contaminants at work A guide to local exhaust ventilation (LEV). https://www.hse.gov.uk/pubns/priced/hsg258.pdf
- WIS31. Narrow band saws. Safe working practices. https://www.hse.gov.uk/pubns/wis31.pdf
- WD1. COSHH essentials for woodworkers. Bandsaw. https://www.hse.gov.uk/pubns/guidance/wd1.pdf
- L22. Safe use of work equipment Provision and Use of Work Equipment Regulations 1998. https://www.hse.gov.uk/pubns/priced/l22.pdf