Wood dust exposure in manufacturing in Great Britain

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Andrew Simpson LFOH

Contributing authors:
Helen Beattie, Dr Chrysanthi Lekka, Dr Susan Hambling, Dr Emma Tan, Dr Tim Yates and Chris Keen

Wood

- Classed as hardwood or softwood.
- Used as a fuel, as a construction material, in manufacturing, as well as for paper.
- Trees are converted into timber or can be chipped to make board.
- Wood dust is generated by the machining and working of wood and wood-containing materials.

Health Effects

- Both hardwood and softwood dust can cause respiratory sensitisation and dermatitis, whilst hardwood dust can also cause sino-nasal cancer.
  - EH64 Summary criteria for occupational exposure limits, HSE 1996.
- Wood dust is carcinogenic to humans. There is an excess risk of cancer from exposure to softwoods, but the magnitude of the excess was small in comparison to that from hardwoods.
  - IARC Monograph 100C, 2012.

COSHH Regulations

Control is deemed adequate when:

- the eight principles of good control practice are implemented,
- exposure is below the WEL (5 mg/m^3 8-hr TWA for both hardwood and softwood dust), and
- for respiratory sensitisers and carcinogens exposures must be reduced to as low a level as is reasonably practicable, ALARP.

Exposure Limits

- The EU Carcinogens and Mutagens Directive has been amended with a new limit for hardwood dust of 3 mg/m³ as an 8-hr TWA for 17 January 2020, and 2 mg/m³ three years later.
- Companies working with both softwood and hardwood would have to comply with the new lower limits for hardwood dust for any wood dust exposure.

Objectives of this work

- Monitor exposures to wood dust at manufacturing sites having a reasonably good health and safety record.
- Establish a baseline occupational exposure dataset for wood dust characterising good control practice.
- Identify practicable exposure control improvements within the woodworking manufacturing sector.

HSE occupational hygiene survey

Occupational hygiene surveys conducted at 22 sites:

- five sawmills,
- six joineries,
- six furniture manufacturers, and
- five sites building and repairing boats.

Eight of the duty holders above were previously included in a HSE survey in 1999-2000.

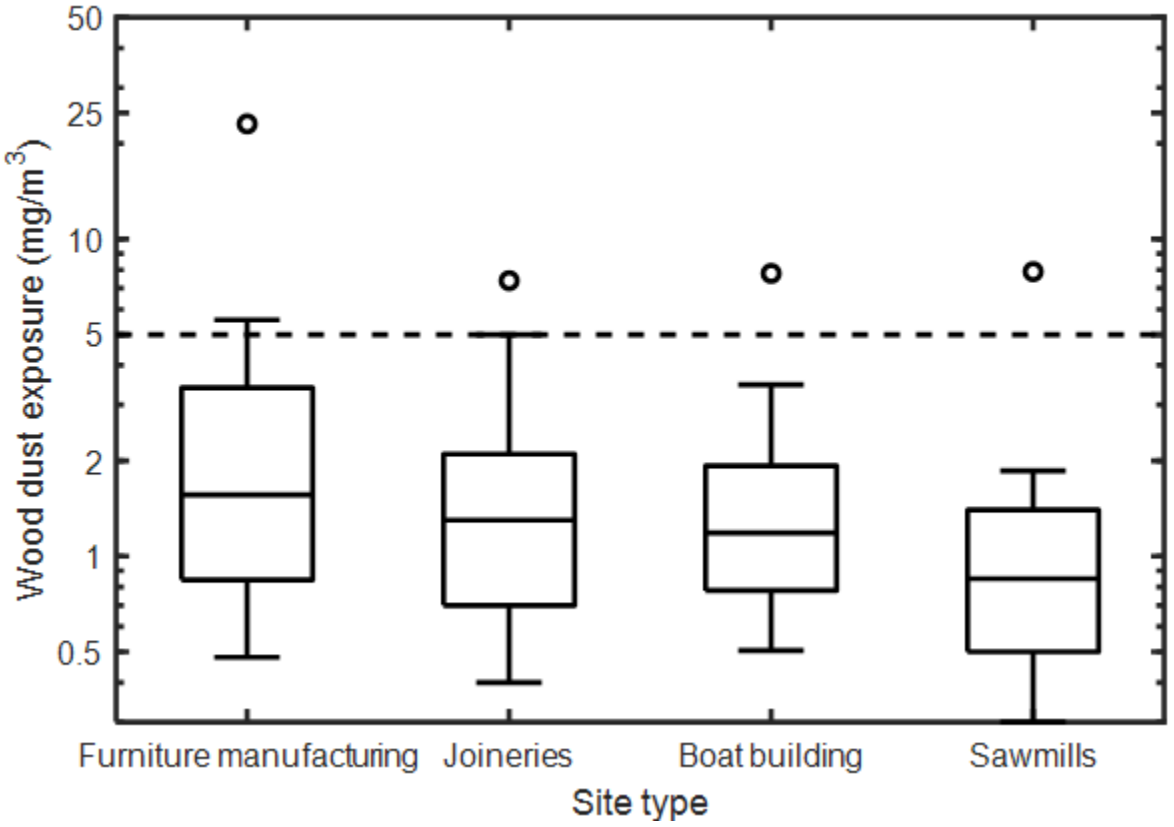
Approach

- A single shift and covering all activities generating airborne wood dust was studied.
- Task-based and full shift personal monitoring was conducted using MDHS14/4, and included regular maintenance activities (eg cleaning and changing LEV waste sacks).
- Working practices and exposure control measures were identified and assessed to determine their effectiveness.
- Work activities were rationalised into 13 job categories taken from the 1999-2000 HSE survey.

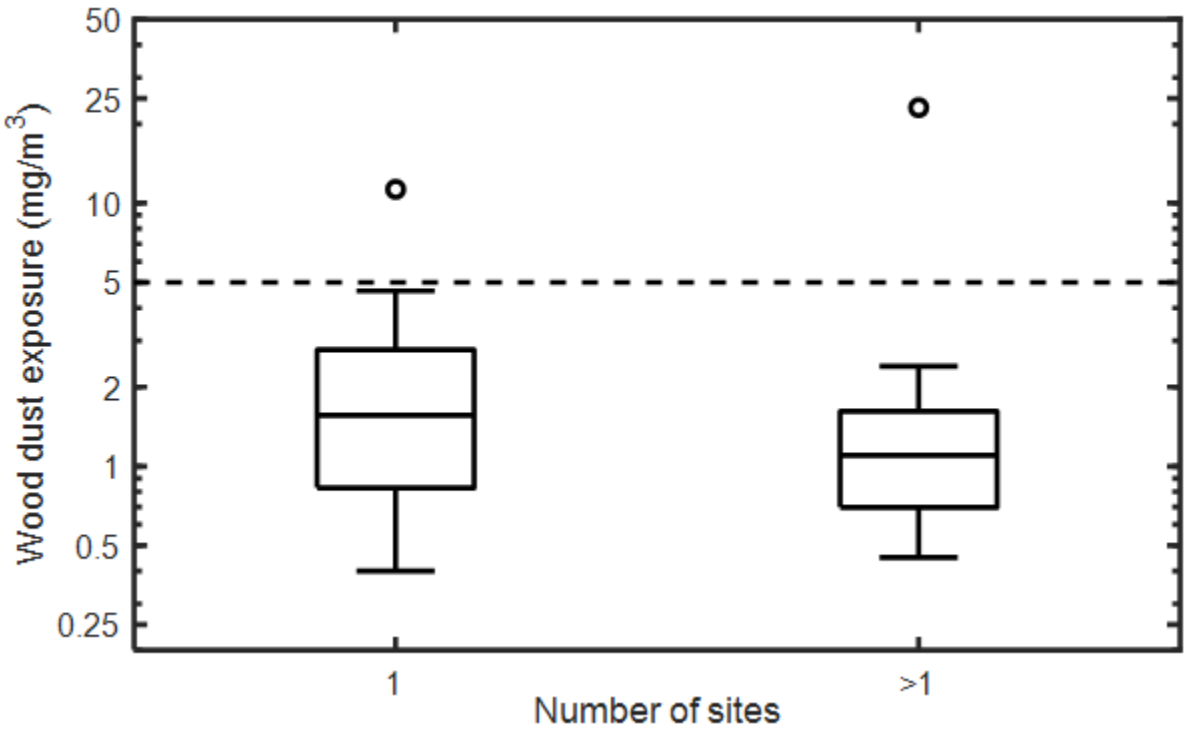
Exposure measurement results

- 252 8-hr TWA exposures from 22 sites collected of which 216 were hardwood and mixed hard and softwood from 19 sites.
- Median exposure: 1.2 mg/m^3.
- 90th percentile: 3.9 mg/m^3.
- 6% of all exposures were >5 mg/m^3.
- 18% of hardwood/mixed wood exposures were > 3 mg/m^3, and 27% were > 2 mg/m^3.

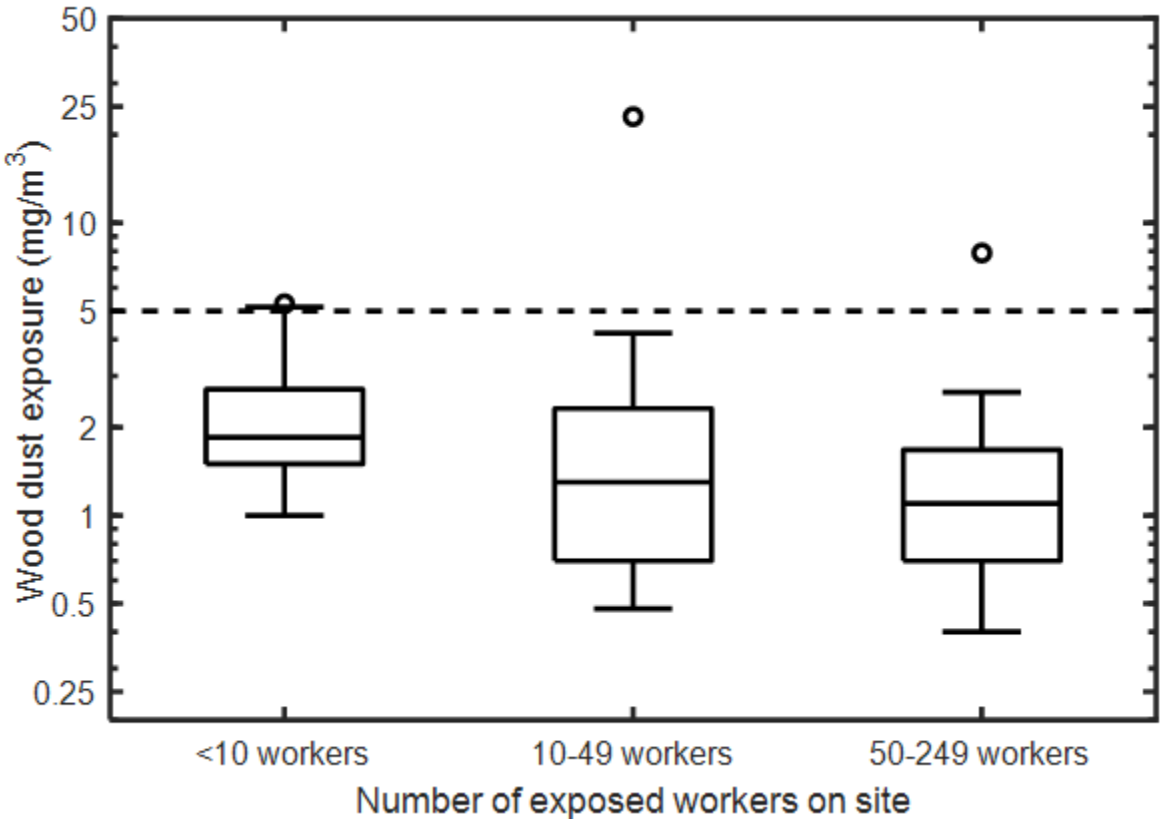
Median 8-hr TWA exposure measurements by site type



Median 8-hr TWA exposure by number of sites occupied by employer



Median 8-hr TWA exposure by size of exposed workforce



Exposure (8-hr TWA) by activity

Activity	No. of samples (No. of sites)	Median (mg/m^3)	90th percentile (mg/m^3)	% > WEL
Sanding	5 (3)	3.2	-	40
Cleaning and maintenance	3 (3)	1.9	-	0
Multi-tasking	106 (21)	1.5	4.4	8
Circular sawing	13 (7)	1.3	2.9	0
Band sawing	14 (4)	1.2	2.2	0
Routing	11 (5)	1.2	3.5	9
Other tasks	49 (10)	1.2	3.7	6
Tenoning	4 (1)	1.1	-	0
Assembly	27 (4)	0.9	2.2	4
Moulding/shaping	15 (4)	0.6	1.2	0
Cross-cut sawing	5 (5)	0.4	-	0

Cleaning and maintenance exposure task specific data

- Exposures relative to a nominal short term exposure limit (STEL) of 15 mg/m³.
- 5/11 workers changing LEV waste bags were above the ‘STEL’ (median 9.0 mg/m³).
- Typically took 2% of their time but represented 12% of their exposure.
- 3/10 workers sweeping up were above the ‘STEL’ (median 3.7 mg/m³).
- Also high exposures when using compressed air to clean up (median 6.5 mg/m³, n = 6).

Exposure control related measures

- 10/22 sites had an exposure >WEL.
- 21/22 sites had a TExT for the main LEV system.
- 1/12 sites had a TExT for portable LEV.
- 7/22 sites had RPE face fit testing where required.
- 8/22 sites had their own exposure measurements.
- 13/22 sites had health surveillance.

LEV observations

- Most sites' LEV had undergone a TExT, but only nine sites regularly checked they were working properly, and only two sites actively monitored pressure gauges.
- Examples of poor or uncompleted maintenance were observed at most sites.
- Provision and use of LEV for hand-held power tools was poor. Portable extraction units used were often of a low standard.
- 141/252 workers used LEV at some point.

Inappropriate LEV

RPE observations

- 7/22 sites had tight-fitting RPE face fit tested.
- 12/22 sites provided a low standard of RPE for the work.
- 11/22 sites had no clear requirements for RPE use.
- 78/252 workers wore RPE but only 25 were face fit tested and wore it correctly.

Incorrect donning of RPE

Practicable exposure control improvements

- Improvements to the design and maintenance of the LEV provided to fixed machines.
- Improved exposure control for hand-held power tools and manual sanding (on-tool or combined LEV, better working practices).
- Limiting or ending use of compressed air and dry brushing.
- Automated waste management for LEV air cleaners.
- Improved RPE programmes (all aspects).

HSE 1999-2000 survey woodworking site revisits

- Six sites showed decreases in wood dust exposure, one showed an increase and one no change.
- Improvements were seen in automation, LEV testing, RPE provision and training, health surveillance participation, and use of vacuums for cleaning.
- More generally there has been a rise in workers multi-tasking, indicating a requirement of individuals to have a wider knowledge of health and safety controls.

Conclusion

- 6% of exposures here were above the current 5 mg/m³ WEL, and 18% would be above a 3 mg/m³ hardwood dust exposure limit.
- Sanding and cleaning and maintenance activities were of particular concern.
- LEV for fixed machines was generally adequate, but was poor for hand-held power tools.
- Provision of effective RPE was low.