PROTECTING PEOPLE AND PLACES HSE

The effectiveness of integrated hammer drill extraction units for dust control

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What is a hammer drill?

RCS WEL = 0.1 mg/m^3

How to control exposure?

External extractors

- Recommended in HSE guidance
- Extraction conforms to a performance-based standard (EN60335-2-69)
  - Class M or H
- Not always practical to use
- Requires a power supply
- Control not strictly interlocked to tool
- If used correctly can be an effective means of control

Integrated extractors

- Not in HSE guidance
- Do not conform to any standards assessing effectiveness
- Interlocked to tool
- Less expensive
- Increased portability (runs off tool battery)
- Little to no evidence on control effectiveness

Image available from: https://toolservices.co.za/cdn/shop/files/Makita-Cordless-Rotary-Hammer-Drill-DHR242ZJ-Power-Tool-Services-5906.jpg?v=1708542113&width=1024

Aim of the project

- To evaluate the performance of both external LEV and integrated dust control systems for hammer drills
- Based on comparative testing

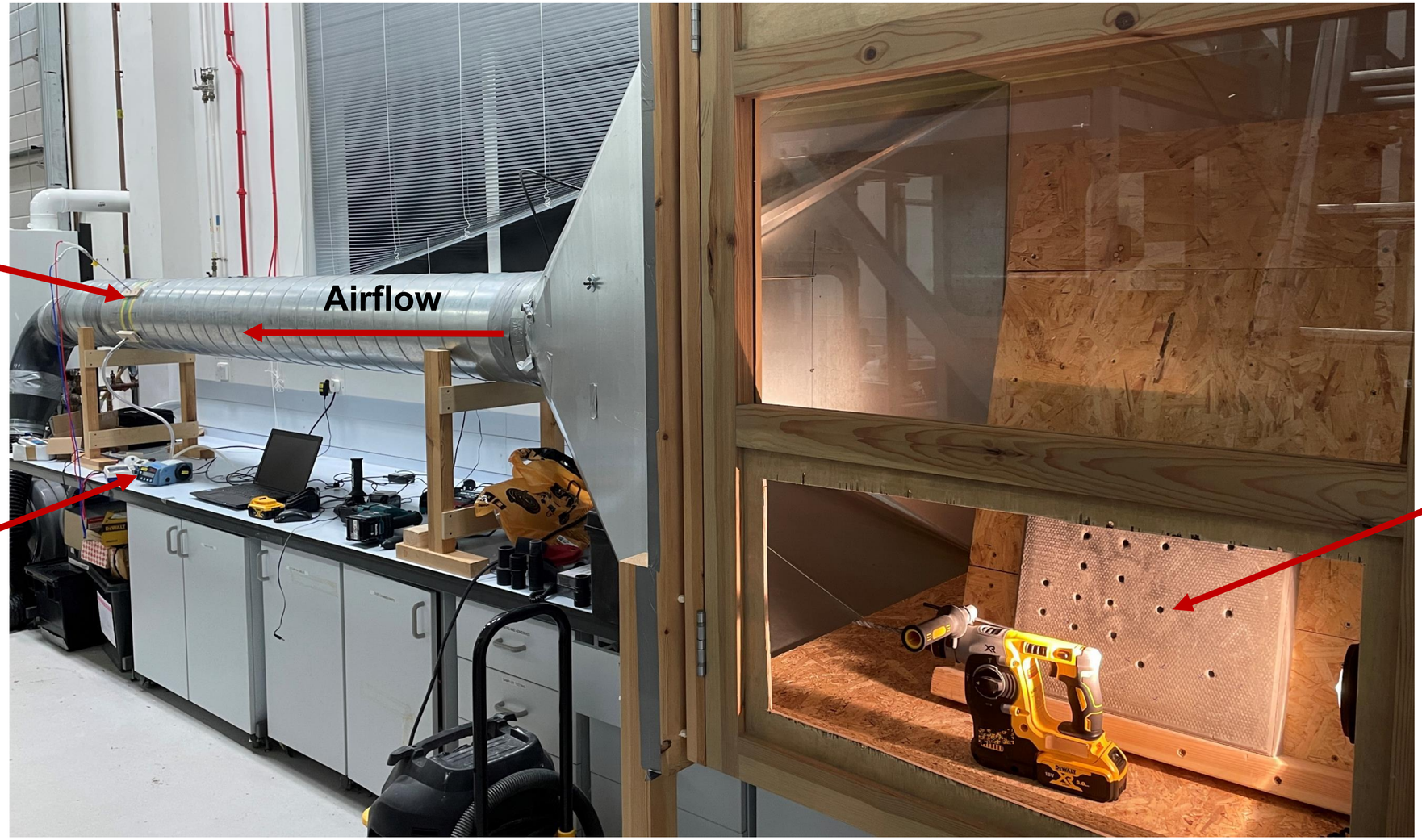
Integrated drill/extractors selected

External extractor with shroud

Capture efficiency rig

Sampling plane

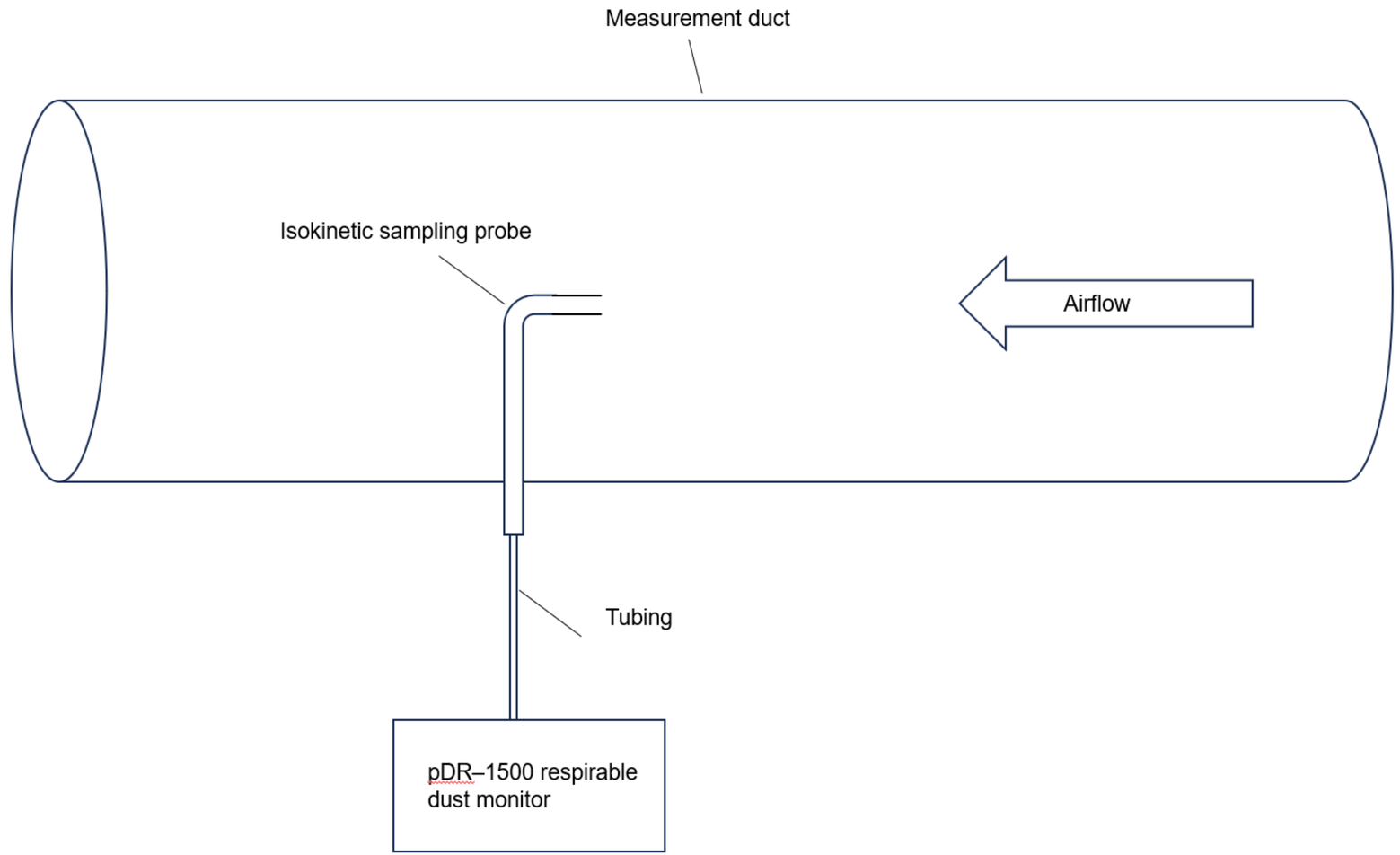
pDR 1500 respirable dust monitor (photometer)



Holes drilled:

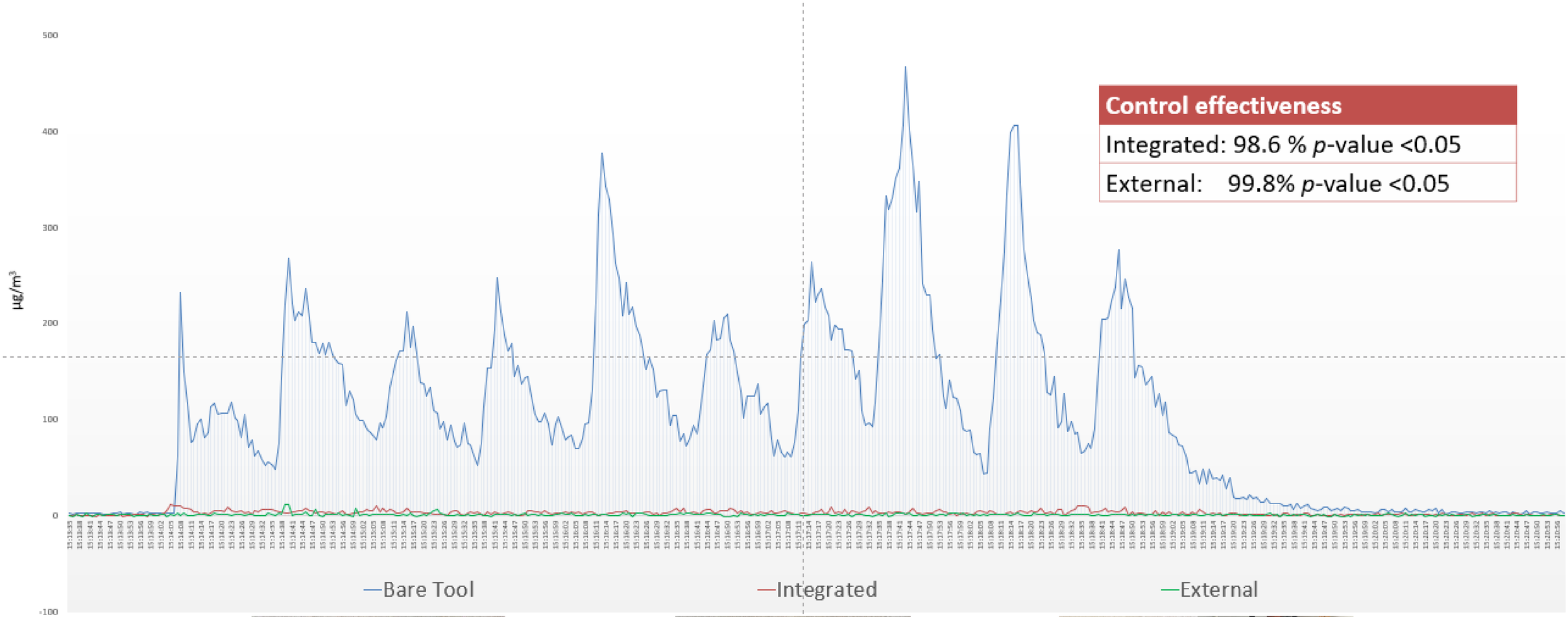
- With no control
- With integrated extractor
- With external extractor with shroud

Capture efficiency – Sampling arrangement



Capture efficiency – Test Method

- Each test, ten 40 mm deep holes drilled over a 5 min period
- 10 mm drill bit by hand (i.e., not using a rig)
- All hammer drills tested
  - Without LEV
  - Self sealing shroud connected to a class M vacuum
  - With integrated extraction
- Each configuration tested 4 times
- New SDS drill bit used for each condition



Control effectiveness
Integrated: 98.6 % *p*-value <0.05
External: 99.8% *p*-value <0.05

Exposure testing – Test method – Modified EN 50632

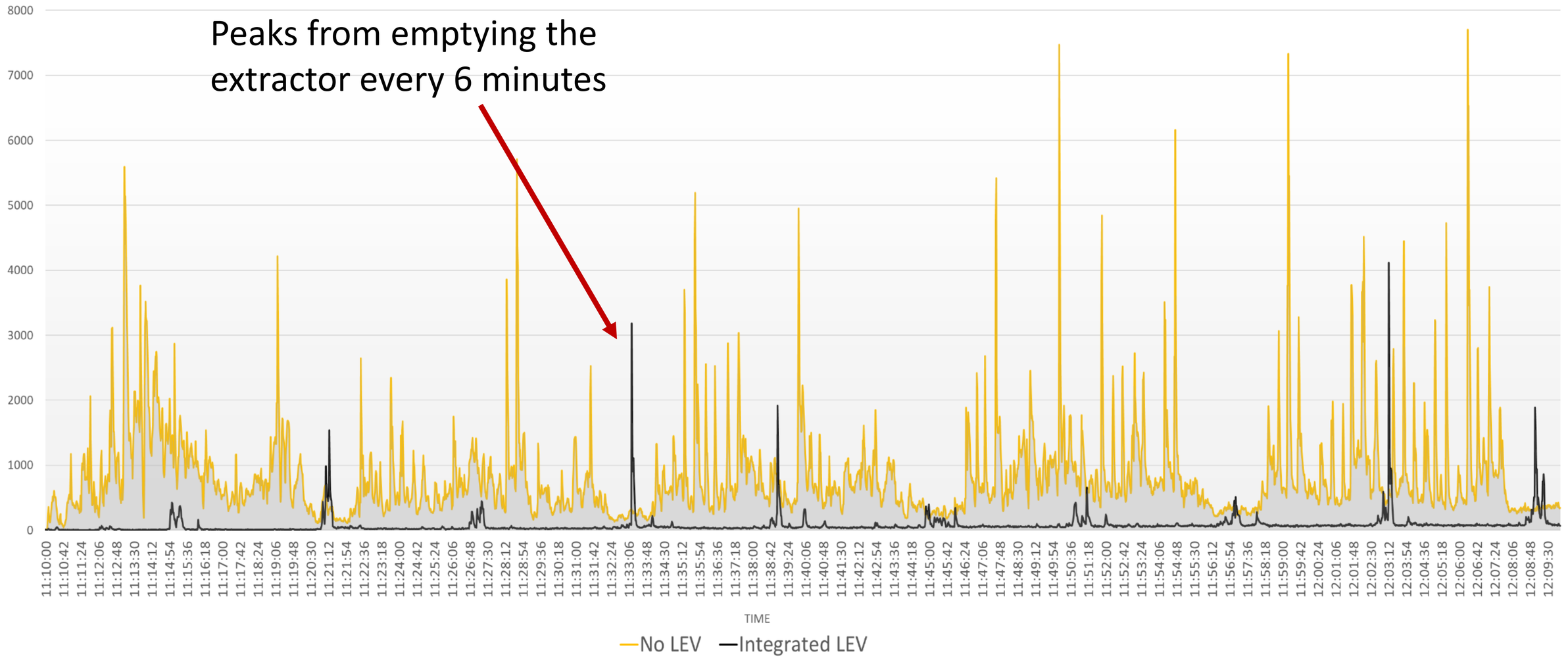
- One drill tested
  - lowest capture efficiency
- Multiple sampling devices
  - Respirable, inhalable, real-time
- Each test, 120 holes drilled
  - 10mm holes drilled (40 mm deep)
- 4 repeats
- Integrated unit emptied after every 12 holes drilled

Exposure reductions (respirable)

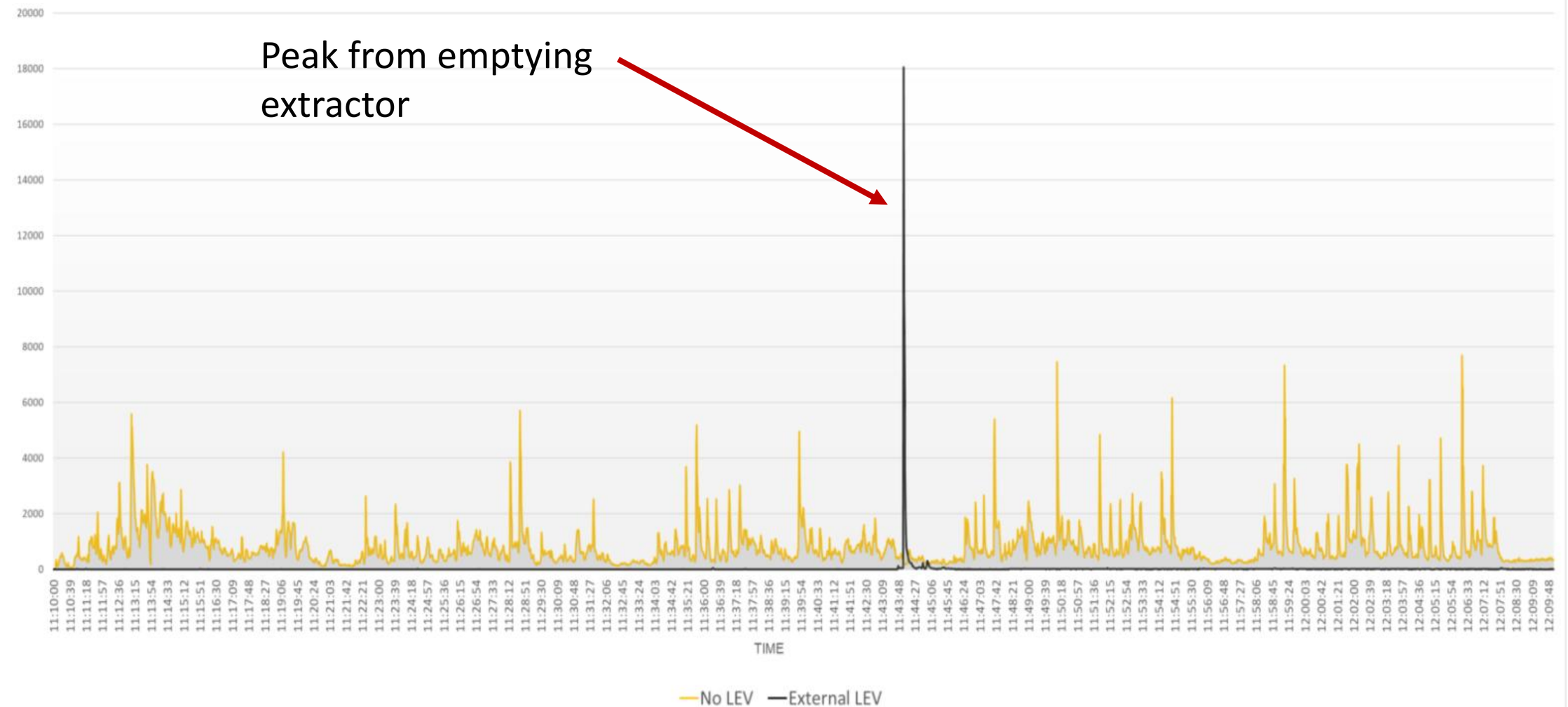
93.3% *p*-value <0.05

87.6% *p*-value <0.05

Exposure reduction – Integrated extraction



Exposure reduction – External extraction



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Conclusions

- This study provides good evidence that integrated LEV can be effective in controlling respirable dust
- The main source of exposure appears to be the frequency with which the small dust bins need to be emptied
- Integrated extractors have many benefits over external extractors but may not be practical in all settings

Looking forward

- A paper on this research is close to publication
- Integrated on-tool LEV likely to become more prevalent and systems already emerging for other tools e.g., jigsaws
- The lack of standards for integrated LEV could lead to varied levels of effectiveness across the market
- Workplace studies to capture real world exposure data could further build the evidence base