

A miniature sampler for “in-mask” workplace exposure measurements

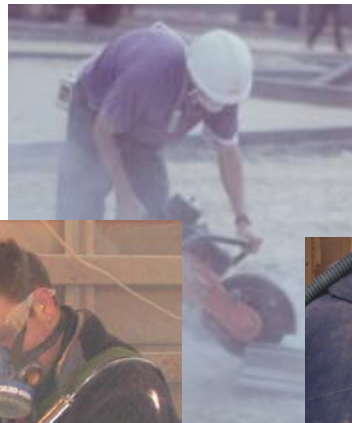
OH 2016

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Health and Safety Executive

Respiratory protective equipment (RPE)

- Often used to reduce exposures
- Frequently for mineral dust exposure (e.g. respirable crystalline silica)



Objectives



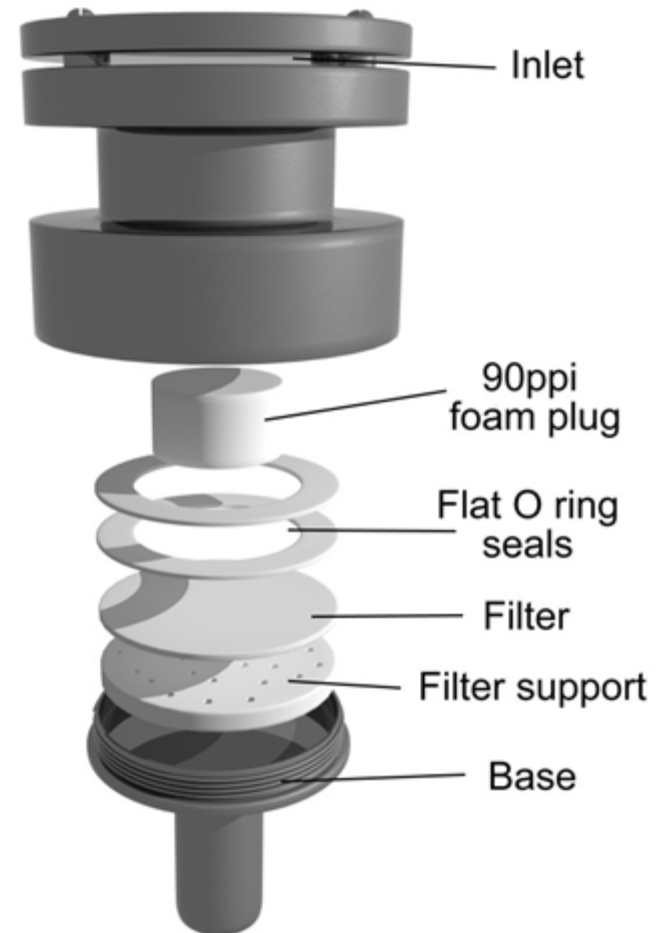
Primary

- What is the actual exposure of a worker wearing RPE?
 - Currently looking at Respirable Crystalline Silica (RCS)

Secondary

- What level of protection does RPE provide in the workplace?

The miniature sampler







Previous work

- Assessment of the respirable fraction collected on the miniature sampler filter
 - Good agreement with (ISO/CEN/ACGIH) respirable convention
- Comparison testing with Total Inward Leakage (TIL) test for RPE on mannequins and humans
 - Good agreement on mannequins; limited data with humans

Validation

- Does the miniature sampler negatively affect the protection offered to the wearer?
- Does the miniature sampler give useful results?
- Is the miniature sampler a practical option?

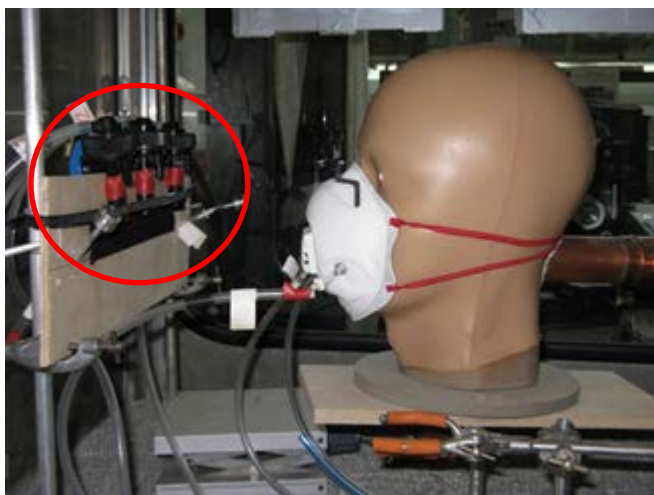
Effects on the wearer's protection

- The European standard for FFP3 disposable masks is EN 149:2001 + A1:2009
- Clause-by-clause assessment of the modified mask with miniature sampler including:
 - Inspection for burrs/sharp edges
 - Simulated wear
 - Total Inward Leakage (TIL) testing

Chamber experiments

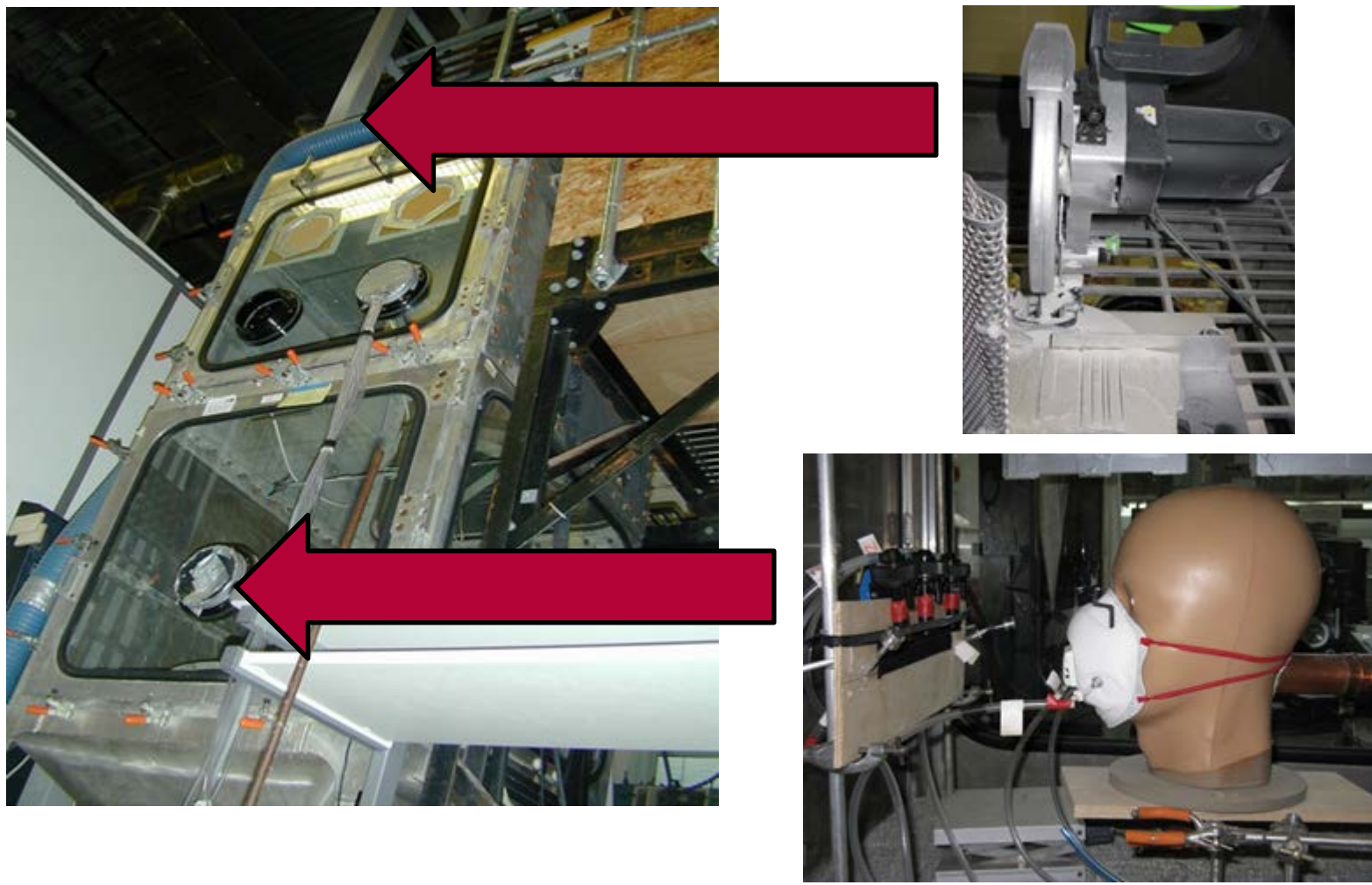


Sand stone cutting – simulating a ‘real’ task
90% quartz and 10% feldspar

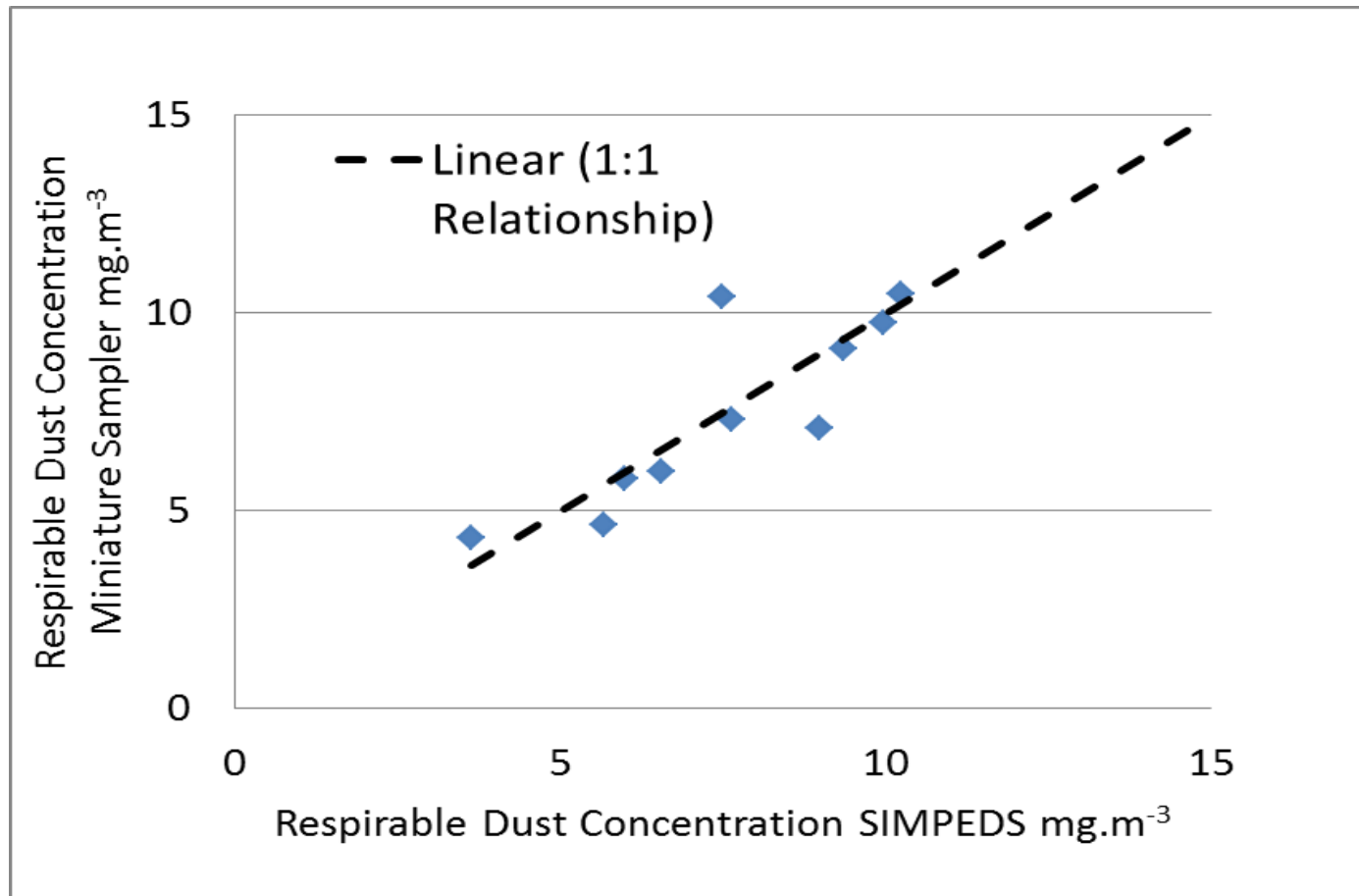


Breathing mannequin
respiratory minute volume
30 l/min

Comparisons with mineral dust

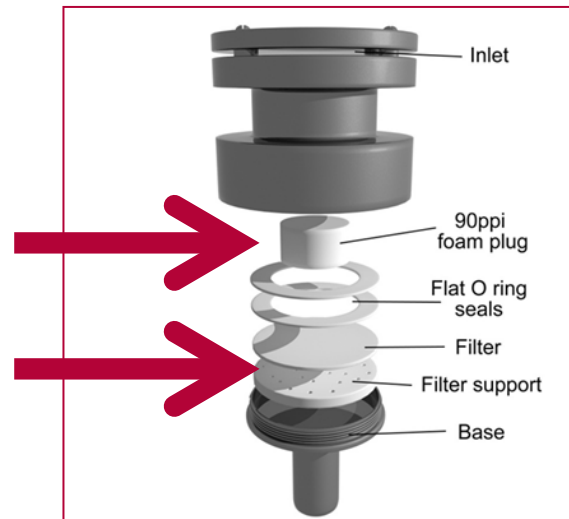


Comparison with SIMPEDS

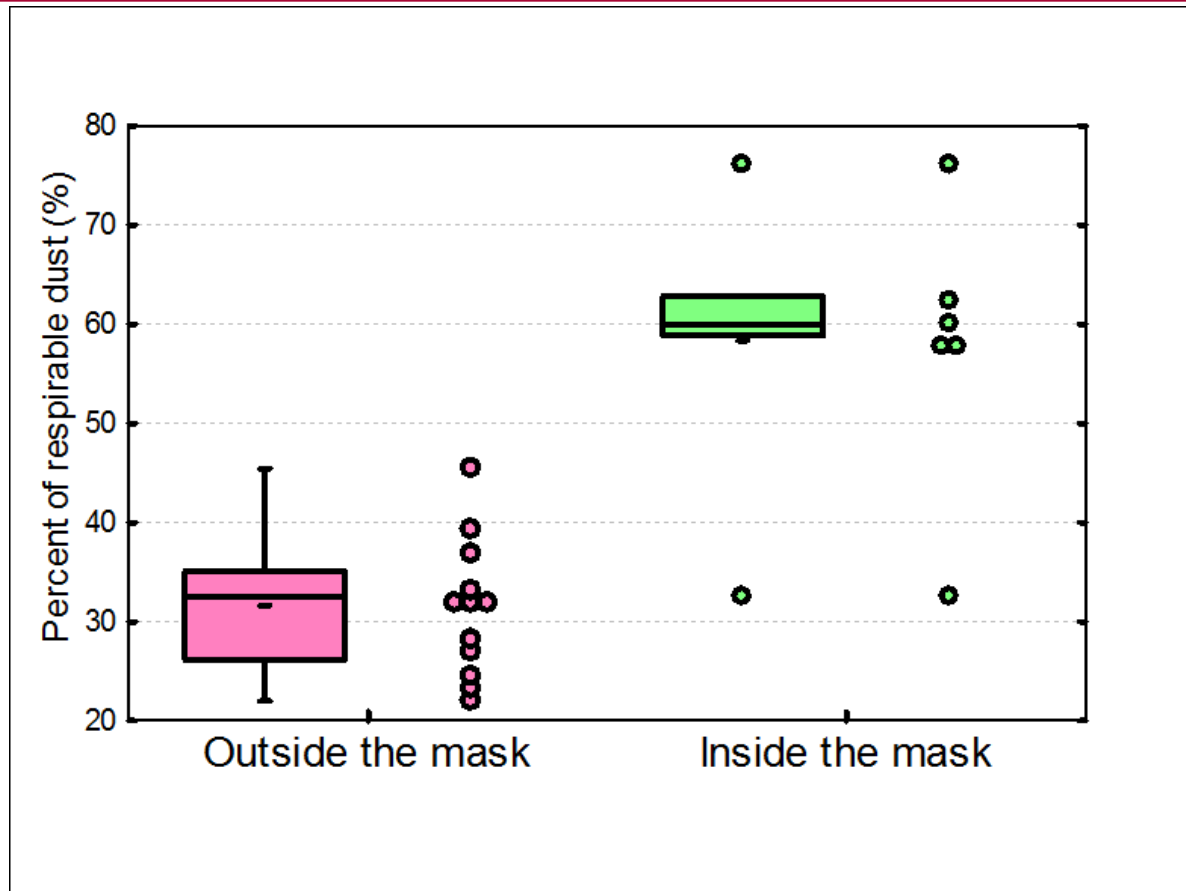


Respirable dust

What is collected on the filter, and what is collected on the foam?



Proportion of respirable dust



Generally reduces the concentration levels of all particles
Smaller particles get through better - larger ones still get through

Site visits

- To identify issues during practical field use
- 3 visits planned
- ~9-12 people in total
- Ethics approved protocol
- Modified RPE approved for use in the workplace
 - For research only

Site visits

- Only one worker had measurable mass of respirable dust from inside the mask



Site visits



Further work

- Additional 2-3 workplace visits
- Laboratory comparison of protection factors
 - Mannequin and human
- **Long term**
 - Workplace exposure measurements of hazardous dusts
 - Workplace measurements of protection factors for RPE

Questions

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