LEV – Extracting the Best Practices

Brandon Hall Hotel, Warwickshire
Thursday 4 February 2016
LEV – Extracting the Best Practices

Tracey Boyle – BOHS President-Elect
Welcome & Introduction
Health like Safety?

99%

1%
Maximum daily exposure
LEV Design
Good Practice

Jane Bastow CMISOSH MILEVE
MD P&J Dust Extraction Ltd.
Hierarchy of Control

Eliminate
Substitution
Engineering Controls (LEV)
Admin Controls (Manuals / Procedures)
Personal / Respiratory Protective Equipment
Principles of good control practice

- Minimise emission, release and spread
- Consider routes of exposure
- Control measures proportionate to the risk
- Choose effective control options
- RPE – for maintenance procedures only
- Review the effectiveness of controls
- Provide information and training
- New measures, new risks
What employers need to know when LEV is appropriate

• The key properties of airborne contaminants
• How gases, vapours, dusts and mists arise
• How contaminant clouds move in the surrounding air
• The processes & sources of airborne contaminants
• The needs of the operators affected
• How much control will be required
• How to prepare a specification for the LEV designer
• What to tell the LEV supplier
What designers need to know

• Their role and legal responsibilities
• How to liaise effectively with the employer and installer
• Hazardous substances to be controlled
  – The applicable WEL or other standard
  – How to determine an appropriate benchmark
• The principles of LEV hood design
• How to
  – apply hood design to the processes & sources
  – design LEV for ease & safety of checks & maintenance.
  – specify airflow, duct, filter, air mover, air cleaner, discharge, instrumentation and alarms
What else LEV Designers need to do

Prepare

- Specification for in-use performance checks & logbook for the system

- LEV user manual with
  - Schedules for maintenance
  - Commissioning report contents list
  - Statutory thorough examination and test report contents list
  - Reminder that all users should be trained
Employers Liaison with Designers

The Employer must provide sufficient information for the LEV designer to be able to produce a design that will be safe, effective and easy to maintain.

This means full details of the work processes and the substance(s) to be controlled.
CoSHH Regulation 6 Risk Assessments for the process(es)

Safety Data Sheets ("SDS") for all substances used or created in the process(es)

Process information such as methods, substance quantities used, processing temperature and any mixtures / compounds that may affect the application of advice given in the SDS
DSEAR Risk Assessment for the process(es) with *Hazardous Zoning* information for:

- Process work place,
- Hazardous substance source areas,
- LEV location,
- Discharge location
- Adjacent areas

Copies of any existing Dust Explosibility or Air Monitoring or Personal Sampling reports
Data from Employer - 3

- Form of the hazardous substance, e.g. solid liquid dust gas
- Changes to the form of the hazardous substance as a result of the process, e.g. machining the solid creates dust, the liquid is heated and creates gas/fumes
- Volatility of liquids in use, and dustiness of solids
- Operational information - number of work stations, how many in use simultaneously, typical weekly hours of use, and seasonal/shift workload variations
If any of the data needed is missing help to make the client aware of how they can fill in the gaps.

Is the design to allow for potential future expansion?

The Designer must observe the process in operation

Review full site details including Asbestos Register

Agree an Exposure Benchmark
ATEX & DSEAR

Is the substance being controlled (or are other substances in use nearby) potentially explosive?

Is any part of the LEV system situated in an area where there is or there could be a potentially explosive atmosphere?

Is there a potentially explosive atmosphere contained within the LEV system?

Do you know the Kst values? LEL? UEL?
Summary for Designers

The designer is responsible for interpretation of the Employers requirements.

Producing an easy to operate and maintain, energy efficient effective LEV design.

That controls exposure to the specified hazardous substance(s) to within an agreed benchmark.

Ensuring that the design meets the needs identified in the Employers Risk Assessments for the process (for both COSHH & DSEAR).
Competency

The Designer has a duty under section 3 Health and Safety at Work etc. Act 1974 to provide competent advice.

Ensure you have issued a detailed schedule of the data provided and all assumptions made.

Detail what the system has been designed to control:
- List the specific site, the process & the substances,
- Define exposure limits & agreed exposure benchmark
- Other hazards taken account of e.g. Fire & Explosion

CIBSE

ILEVE

Improve workplace air quality
Last Few Words

LEV is designed to Control Exposure to an inhaled substance which is hazardous to health.

You are protecting workers; some of whom will not understand or care about the risks inherent in their work or the necessity for using the control measures, so using the LEV has to be the easy option

A common mistake that people make when trying to design something completely fool-proof is to underestimate the ingenuity of complete fools.
Are there any questions that I can try to answer now?

Or are you saving them for the Questions and Answers Round Up at the end of the day?
Installation of LEV Systems

ADRIAN SIMS
CEng. BSc. (Hons) CoC (Control) MFOH(S) MIEnvE MIEPlantE
We have all seen poorly installed LEV systems.

From capture hoods, that don't capture to...
Poor modifications

Sweeping branch?

Capture distance?

Systems the have been poorly modified.
The badly installed systems

Leak proof joints?

Sweeping branch?

Means of balancing?
Will this give a capture distance of 1m?

Respirable dust being re-circulated?

Controlling all sources?

Suitable test points?

The systems we can't test or don't get used
The ones that are just unsafe!
Installed to manufacturers recommendation's?

Or not installed in accordance with manufacturers recommendations....
The ones that make ask; Why…
Re-circulation?

Or just basically wrong
Discharge to a safe place?

Do these penetrate the boundary layer?
And positioning!
What does HSG 258 say on the installation of LEV systems?

Table 15 says we should:

- Minimise bends and smooth junctions
- Make corrosion resistant where necessary
- Include drainage points for liquid and mists
- Include access to clear blockages
- Discharge to a safe place
- Make sure there is safe and easy access to necessary parts of the system
It also gives guidance on ducting and how it should be both design and installation including guidance on:

- duct wall thickness
- corrosive materials
- location of test points
- access doors
Yet this is what we get:

- Square T's which cause turbulence
- Fan discharge ducts going against the air flow

All cause excessive turbulence and noise
It also says to keep duct work within the building under negative pressure.

This is to ensure any leaks are into the system and not blowing hazardous fumes back into the working environment.

This is easily achieved by putting the fan outside which has the added benefit of

- reducing noise levels within the working environment
- taking up less internal floor space
In reality?

Again, this is what we too often end up with.

According to TWO LEV companies who tested this system this was deemed acceptable to controlling the hazardous substances.

To make matters worse the finance director of this company, despite seeing this evidence, two years on still will not sanction the repair works.
According to TWO LEV companies who tested this system this was deemed acceptable to controlling the hazardous substances.

To make matters worse the finance director of this company, despite seeing this evidence, two years on still will not sanction the repair works.
It also gives guidance on stacks both design and positioning.
It explains the boundary layer and what a stack should look like.

It also gives us a few pictures to help.

However, despite the TWO red crosses, how many of this style rain cap do we STILL see on LEV systems!
In reality?
In reality?
Access

The designer should incorporate the need for operator access. These needs include routine work activity, inspection, cleaning, testing, maintenance and repair. If access is difficult, it is less likely that the employee will carry out these necessary duties and so the LEV system performance will degrade.

We should be building systems that are safe to access, not just during installation but also
In reality?

during testing and servicing of systems.
HSG talks about reducing the ongoing risk associated with installations relating to maintenance and testing.

It also refers to the CDM regulations that will apply to the installation of LEV plant.
CDM Regulations

CDM Says we must
**Eliminate,**
**Reduce** or
**Control**
foreseeable health and safety risks through the design process, such as those that may exist **NOT** just during the construction phase but **ALSO** in maintaining and using the equipment.
In reality?

As test engineers, don’t we need to get to the fan to take readings on a regular basis?
Better?

Is this an easier and safer fan to access?

Shouldn't manufacturers of plant comply with the COSHH and CDM Regulations?
So what do suppliers of LEV systems say in their quotes?
In this example they twice mention that the systems will be **commissioned in accordance with HSG 258** so as a customer you have to be pretty happy that you are going to get a compliant system. But...
• Hazardous substance?
• Existing exposure levels
• WEL Levels?
• Reduction factor?
• Proposed exposure levels when controls in place
• Capture distances?
• User training?
and in reality this is what they got.

A six figure system that had to be ripped out, re-designed and installed all at the clients cost.
There is additional guidance out there to help installers get this right.

The B&ES (formerly HVCA) have their documents

- DW144 for sheet metal ducting and
- DW154 for plastic ductwork installation.

This gives guidance and best practice on matters such as:

- the number of brackets that should be used
- thickness of ducting
- how duct joints should be formed and
- access doors

All ducted systems should as a minimum be installed in accordance with these standards.
B&ES Accreditation?

- Members of the BESA are subject to regular third-party inspection and assessment of their technical competence and commercial capability.
- The commercial and financial standing of all BESA members is independently evaluated.
- BESA members are able to demonstrate that they operate according to fair and reasonable commercial standards.
- Members of the BESA are required to perform according to criteria established by a range of industry-recognised specifications and good practice guides.
- BESA members must adhere to robust health and safety policies and procedures, and must promote a positive safety culture throughout their organisation.
- Members of the BESA comply fully with the mandatory health and safety requirements contained in the Construction (Design and Management) Regulations.
- There is a requirement on BESA members to prove that they have controls in place to ensure that their work complies with all aspects of the Building Regulations.
- BESA members must have in place adequate employers' and public liability and professional indemnity cover.
- Awareness of environmental issues and an ability to manage elements such as waste, pollution, recycling and materials procurement is a requirement on all BESA members.
- All BESA members have in place adequate policies in relation to personnel recruitment, selection, education and training.

Companies that are accredited with B&ES will have to:

- have their work inspected
- have assessment made of technical and commercial capability
- work to industry best practice and standards
- adhere to robust Health & Safety practices usually through CHAS or SafeContractor Scheme
- their work must comply with Building Regulations and
- have policies and on-going commitments to recruitment, selection and training.
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Just to confuse everyone they have recently re-branded to BESA - Building Engineering Services Association.
How do we move forward?
The road workers, for temporary road works, have their Chapter 8, which for differing scenarios, gives guidance on the necessary set-up of temporary traffic management.

Could we use something similar in LEV industry for standard processes and installations?
We can calculate the explosive power of a substance and site the unit accordingly.

Typically from wood dust you may get a 13m flame from a filter plant, have a look on Youtube.

More importantly it’s not the initial blast that causes most problems but the secondary blast from the initial shock wave lifting and igniting the dust that has collected on the factory steel work and high level surfaces.

The guidance says we should vent the explosion to a safe place.

But what is a safe place?
Explosion venting

As an industry standard, shouldn’t we aim to vent all explosions vertically outside?
One of the first things left off of jobs is the inspection hatches.

They cost money and with contractors being driven down on cost they are often not fitted.

Again HSG258 requires “leak proof inspection hatches” to be fitted.

However they are more-expensive to retro fit but it prevents this…
What is the down time to clear a blocked system?

What would the cost to production be?

Or even worse, what if a duct collapses to the floor like this one containing metal dust did?
Also, more simply, shouldn’t we clearly label systems that contain hazardous substances?

Isn’t this a no brainer??
We know the stats. Despite the HSE being “proud” of these numbers, they are not getting any better.

The HSE are currently on a campaign to improve the Health and Safety in the workplace, its all over Linked In, asking for new ideas and how can we improve things.

To me, we need to
• educate members within our industry, raise the standards within the LEV industry,
• educate clients who purchase control systems,
• enforce some of the standards and guidance that are already in place

However the bottom line is
At the end of the day, we can include for all the things suggested and include for them but unless clients are prepared to buy into this then we will not win the projects and therefore not survive.

Industry will continue to needlessly cost the lives of thousands of people each year.
LETS STOP THIS!
Local Exhaust Ventilation

An Insurance Engineer Surveyor’s view for Thorough Examination and Test (TExT)

Dean Greer
MSOE, MBES, MILEVE, Tech IOSH, Independent member of BOHS
Control of Substances
Hazardous to Health 2002
(As amended - Sixth Edition)

Control of Asbestos Regulations

Control of Lead at Work
Supporting Documentation

- HS(G)258
- EH40
- HSE Guidance
- Company & Industry Guidance
- LEVC03
Regulation 9 Maintenance, examination and testing of control measures

1. Every employer who provides any control measure to meet the requirements of regulation 7 shall ensure that –

   - (a) in the case of plant and equipment, including engineering controls and personal protective equipment, it is maintained in an efficient state, in efficient working order, in good repair and in a clean condition; and

   - (b) in the case of the provision of systems of work and supervision and of any other measure, it is reviewed at suitable intervals and revised if necessary.
Pre-Inspection Preparation

- Liaison with site responsible person
- COSHH/Risk Assessments
- MSDS
- Commissioning Report
- Air monitoring/Sampling Report(s)
- LEV User Manual
- LEV Logbook
- Previous LEV Reports
On site Preparation

• Review all information available
• Risk Assessments
• Site familiarisation
• Liaison with site staff and operatives
Types of Examination and Test – Reg 9 (2)

- First Thorough Examination and Test (If there is no previous ‘TExT’)
  - Visual examination of system
  - Qualitative assessment of the control / measure containment
  - Check hood distances
  - Measurement of all static pressures and air velocities and compare with standards/design
  - Examine air cleaning plant
Types of Examination and Test – Reg 9 (2)

- Thorough Examination and Test (TExT)
  (Where there is a ‘history’ and no changes are observed)
  - Visual examination of system
  - Qualitative assessment of the control / measure containment
  - Check hood distances
  - Measurement of all static pressures and air velocities and compare with standards/design
  - Examine air cleaning plant
What is a TExT

- Comprises a Qualitative and Quantitative assessment, where;
  - The Primary assessment is through the Qualitative element, comprising;
    - A Visual Examination, checking design and material condition
    - A Light Test, witnessing process operation and assessing the Engineering Control
    - A Smoke Test (where site conditions allow), observing air flow and sealing of the LEV system
  - Supported by the Quantitative assessment, comprising;
    - Velocity measurements
    - Pressure measurements
    Comparing against previous records and published minimum recommended rates
Thorough Examination and Test Completion

• If a client does not allow for the thorough examination and test or the system is inoperative then a PNA is issued

• If a TExT can’t be completed (due to operational issues, breakdowns etc) a thorough examination and test then issue a Partial Report
Report Content

- The TExT report serves as an audit trail of the COSHH Management System
- A meaningful comment is required for all mandatory fields
- All defects identified require identification of necessary corrective action
- Ensure practical identification of test points
- Identify test result deterioration (quantifiable)
- Capture support document information
- Provide ‘Value and Information’
Aide Memoir

Your assessment is based on the result of your visual thorough examination ie Does the LEV control the hazardous substances
Summary and final thoughts

• A correctly designed, installed and commissioned LEV is there to safeguard the health of those that use it and others in the workplace.
• A TEXT ensures ongoing control of the hazardous substance, or not.
• All of these have to be completed correctly.
Any Questions?
LEV – Extracting the Best Practices

Refreshment Break & Exhibition
TExT’s. What does the guidance say and the Approved Code of Practice require?

Bob Daunton
HSE
Basingstoke.

February 2016
Disease Reduction Programme
2006: The LEV project.

• The aim was to bring about effective improvements in exposure control via local exhaust ventilation (LEV) in UK industry.
The LEV project covered:

In summary-

• Design of systems.
• Use.
• Maintenance.
• Examination and testing.
• Production of guidance.
A very wide-ranging project.

HSE estimated (2006 data) that in the UK there are:

• 330,000 LEV systems
• 200,000 systems were not tested
• Thought that many LEV systems gave poor control.
• MAJOR health benefits if systems work effectively.
With regard to TExT’s what happened next?

- Guidance now in HSG 258 (Chapter 10)
- TExT is a staged process:
  - Stage 1
  - Stage 2
  - Stage 3
Stage 1: Visual & structural examination.

- External/internal examination of system.
- Check filtration system is working effectively.
- Check monitors and alarms.
- Check air mover
- Initial indication of effectiveness (dust deposits etc.)
Stage 2: Measure Technical Performance.

This may include:

- Measurements at test points such as hood faces, branch & main ducts.
- Fan checks.
- Alarm checks.
- Air cleaner performance.
- Make up air supply.
Stage 3: Assess Control Effectiveness.

This may include:

- Observations (e.g. sawdust accumulation)
- Smoke tests with either smoke tubes or smoke generator
- Air flow measurements
- Dust lamp tests
- Observation of working practices.
Stage 3: Assess Control Effectiveness.
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Stage 3: Assess Control Effectiveness.
Additional items.

- Test points should be marked clearly!
- The employer should ask the examiner to attach a test label (pass or fail) to each hood.
- Reports should be retained for five years.
Where to go for further information.

• First stop……The HSE website.

• Huge amount of information on LEV and control. Type into search box “LEV”.

• We intend to provide some good TExT examples shortly.
What does the Approved Code of Practice Require?

There is a different legal status between HSE guidance (such as HSG 258 “Controlling airborne contaminants at work”) as regards TExT’s and what is given in the COSHH Approved Code Of Practice with regards to LEV and TExT’s.
What does the Approved Code of Practice Require?

• Following guidance is not compulsory, but generally, if you follow HSE guidance you are doing enough to comply with the law.
What does the Approved Code of Practice Require?

- ACOP’s have a special legal status.

- If you are prosecuted for a breach of health and safety law and it is shown you did not follow the relevant provisions of the ACOP then you will need to show you have complied with the law in some other way.
What does the Approved Code of Practice Require?

• Lots and lots!!!!!!!
• Name and address
• TExT dates
• Plant ID, Substances controlled,
• Operation conditions, diagrams
• Performance indicators (Smoke etc.)
• Sampling results?
What does the Approved Code of Practice Require?

- Repairs and maintenance needed before retest
- Critical defects identified
- Signatures and date

- FULL details are in PARA 186 of ACOP.
What do you do if faults are identified?

• Get them fixed!!!!!
• If you don’t you are a hostage to fortune as fee for intervention (FFI) applies.
What would happen today?

• Under The Health and Safety (Fees) Regulations 2012, those who break health and safety laws are liable for recovery of HSE’s related costs, including inspection, investigation and taking enforcement action.

• Often called “A material breach”
What is a material breach?

A material breach is where you have broken a health and safety law and the inspector judges this is serious enough for them to notify you in writing. This will either be a notification of contravention, an improvement or prohibition notice, or a prosecution.
How much?

- Charge is currently £124/hour.

- Will include all HSE time except travelling time. (Site time, administration, etc etc.)

- HSL costs will be separate but are included.
How much?

• An Essex firm has been fined a total of £15,000 for repeatedly failing to have its systems on its local exhaust ventilation (LEV) system for extracting wood dust and lifting equipment on its rider operated trucks thoroughly examined.

• FFI charges will be extra.
Make the most of advice available.
Make the most of today.

- Don't be afraid to ask for help from others.

- Ask HSE but remember we are not “Free consultants”.

Good Luck!
THE END.
Why Competency is Important?

Robert J Williams
Critical areas

Identify the hazard

Assess the risk

LEV the most suitable control?

Designed & installed properly

used properly

Maintained properly

Health & Safety Executive
Trap #1

Employers need to have enough knowledge to know
- what the hazardous substance(s) are
- what the risks are.
Trap # 2

LEV system in place....

.... but works poorly
Employers over-reliance on ‘poor’ advice from third parties (consultants)
TExT Reporting Initiative (TRI)
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Networking Lunch & Exhibition
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Alvin Woolley – Alvin Woolley Associates
When Things Go Wrong. How Do You Put Them Right?
LEV – Extracting the Best Practices

Equipment Demonstrations & Refreshments
LEV – Extracting the Best Practices

Questions & Answers
Round up