HEALTH & SAFETY LABORATORY

BOHS Conference 2010
Carcinogen Exposure in Surface Engineering

Chris Keen

Scope of presentation

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Background

Aims and objectives

Survey design

Current position

Emerging findings

Remaining work

Background

Surface Engineering Industry, major users of carcinogens :

- **Hexavalent chromium**
- **Nickel compounds**
- **Cadmium**
- **Sulphuric acid - process generated mist**

HSE accept that there are practical problems with large scale substitution, hence a need for a high standard of exposure control.

Industry size & shape

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Still a major UK manufacturing industry

Approximately 500 UK companies

Approximately 3,000 exposed workers

Partnership project between HSE and Surface Engineering Industry

Aims and objectives

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To build on work already conducted between HSE and industry

Assess control standards across the industry

Use of biological monitoring for quantitative exposure assessment

Use of other measurements to investigate exposure routes

Identify exposure mechanisms and provide advice on control

SEA/HSE guidance

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Prevention of Exposure and Control of Chromic Acid Mist

Nickel and Nickel Alloy Plating Operations:
Controlling the Risk of Inhaling Mist Containing Nickel

To be updated to take account of findings

Survey design

Approximately 100 SEA member companies suitable for visits

Provide detailed written feedback to each site visited

Re-visits where necessary

Follow on BM 6 and 12 months post-visit

Regular liaison with industry via SEA

Current position

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45 sites visited as of April 2010, 10 sites revisited

Some use of video visualisation to study task specific exposures

BM follow-on in progress at a number of sites

1150 BM samples received from over 300 different workers

In-house guidance values developed for hand and surface contamination

4 Industry seminars held to date

Visits to date

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Hard Chrome platers

Decorative plating with trivalent and/or hexavalent chrome

Polishing and fettling

Anodising (sulphuric acid and chromic)

Nickel and cadmium plating

Etching and plating of plastics

Speciality chemical suppliers to plating industry

Urinary chromium

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UK BMGV 10 µmol/mol

380 samples from chrome platers,
75 results above the BMGV

750 samples from other workers,
45 results above the BMGV

Urinary nickel

No UK BMGV, guidance value derived from HSL data 24 µmol/mol, agreed with industry

300 samples from nickel platers, 60 results above the guidance value

830 samples from other workers, 50 results above the guidance value

90th percentile of urinary nickel results from project so far is 24 µmol/mol

Air sampling

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Conducted at approx. 10 sites

Inhalation exposures << WELs.

Hexavalent Chromium exposures range from not detected to 0.01 mg/m^3 (WEL 0.05 mg/m^3)

Soluble nickel exposures range from not detected to 0.02 mg/m^3 (WEL 0.1 mg/m^3)

Not giving the full picture regarding exposure

Surface contamination

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Measured using wipe sampling in production areas and notionally clean areas

Significant contamination in canteens linked to high BM results

Wearing and storage of contaminated PPE in canteens and inadequate hand washing are principal causes

Hand contamination

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Measured by hand washing into water

Detectable levels of contamination on workers hands

High levels indicate failure of PPE and are linked to elevated BM results

Other exposure groups

Urinary chromium for polishers using negative pressure RPE is 5 times higher than those using powered RPE.

Potential for very high urinary chromium and nickel amongst maintenance workers and site chemists

Urinary chromium/nickel approximately double for maintenance workers who do not wear chemical protective gloves.

PPE and individual working practices especially important for these groups.

Unrecognised exposures

Exposure potential not recognised during :

- Manual washdown of plated items
- Direct handling of contaminated items

Common failings

Include :

- Poor housekeeping
- Transfer of contamination to ‘clean’ areas
- Inadequate provision of workwear and laundering facilities
- Poorly maintained controls (LEV, mist suppressant, PPE)
- Polishing/fettling without adequate RPE
- Some manual handling issues identified

Nickel exposure

Inadequate control commonplace

Recently reclassified as carcinogen, long recognised asthmagen

Air agitated nickel tanks without LEV not unusual

Other planned research

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To investigate and quantify efficacy of :

- Lip extraction (effect of freeboard)
- Chemical mist suppressants
- Eductors (alternative to air agitation)
- Tank covers

Remaining work

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- Remaining site visits to be completed by Summer 2010.
- BM follow on work to run until Summer 2011.
- Research report late 2011.
- Improved industry guidance

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Further information

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