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professional protection magazine

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## NZ printers phase out solvents

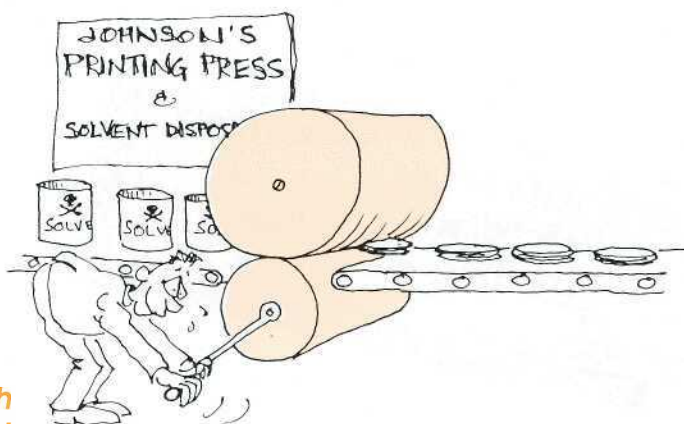
*The New Zealand Printing Industry Health and Safety Society has recommended that seven hazardous chemicals be eliminated from the printing industry.*

It is the first agreement of its kind in New Zealand, The seven chemicals include organic solvents which are widely used in not only the printing industry, but in a variety of other fields,

The solvents to be phased out are:

- Methylene chloride (dichloromethane)
- Toluene
- Xylene
- 2-nitropropane
- Benzene
- Methyl Ethyl Ketone (MEK)
- Glycol Ethers based on ethylene glycols, such as:
  - 2-methoxyethanol
  - 2-methoxy ethanol acetate
  - 2-ethoxy ethanol
  - 2-ethoxy ethanol acetate

The substances were selected from a list of chemicals which are banned by governments, manufacturers' organisations and printing union overseas.



The neuro-toxic effects of exposure to organic solvents are well documented, and the number of cases has been growing. Symptoms include memory loss and poor concentration, moodiness and irritability, sometimes accompanied with slow and slurred speech.

The seven compounds selected for the phase-out are not necessarily the most toxic out of the 35 substances that are banned overseas, An important consideration was that the chemicals in questions must be able to be substituted by less harmful ones.

The success of the phase-out relies greatly on the moral standards of employers, and is backed up by the New Zealand Health and Safety in Employment Act, which states that "If an employer identifies a significant hazard, they must take all steps to eliminate or substitute it."

Solvents are extensively used throughout all manufacturing; there are few industries where solvents do not play a vital role. In many cases, less harmful substitutes can be very difficult or impossible to find and, sometimes, the replacement can even prove to be more hazardous.

ardous than the solvent. For example, although it may have fewer health effects, it could present a greater fire or explosion hazard,

Some New Zealand experts are doubtful of the success of the phase-out. It would be very hard to eliminate toluene, for instance, which is very widely used and may be very difficult to find a substitute for. Getting rid of toluene would remove 67 per cent of all solvents, according to one scientist, who wanted to know how this could be done technically.

However, ink manufacturers did not seem to balk at the prospect of removing the seven chemicals from their list of ingredients. Overall, the response from suppliers and manufacturers had been favourable.



Source: Mackay, J. 1994, 'Toxic solvents — printers move to eliminate hazards', *Safeguard*, No 26, p10

**It's not the chemical  
that's unsafe:  
it's the method!**

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# Bakers bite the dust

*In PPM March 1994 we reported on a Finnish study concerned with bakers and bakeries and the effects of enzymes in the flour dust on the human body. This time, Danish bakeries are put under the microscope, and come up with a lot of dust.*

Bakers by the dozen are allergic and asthmatic because of high levels of flour dust, according to a Danish report.

Ten per cent of bakers suffered from chronic running noses. One in twenty had asthma caused by the flour dust.

Bakers stand the highest risk of respiratory disorders in Denmark. Asthma is two to three times as common in bakers, compared to the rest of the population.

The report recommends that the hygienic limit value for organic dust should be cut significantly. The current limit concentration is three milligrams per cubic metre of air. In most of the bakeries, this level was clearly exceeded.



Source: *Arbetsmiljö* 1993, No 6 p. 14

## Handy Hints



**YOUR GLOVE SHOULD FIT...**

**...like a glove!**

**Over-sized gloves may cause accidents!**

# Skin facts

## from around the world

*Here are some facts and figures on occupational skin care from international data systems:*

- About half of all occupational diseases receiving compensation are skin disorders
- Around one per cent of the work force may suffer from skin disease
- Men constitute a higher proportion of skin disease than women, expressed as a percentage of all occupational diseases
- The prevalence of skin diseases vary according to the type of industry, with rural operations, mining, mechanical engineering, construction and chemical manufacturing at the top of the list.
- **Common problem occupations:**  
*Printers (solvents)*  
*Metal workers (cutting oils)*  
*Housewives*  
*Builders*  
*Caterers & bartenders*  
*Mechanics*  
*Hairdressers*  
*Florists & horticulturists*



- **Common problem agents:**

*Soaps, detergents, other cleaners*

*Solvents*

*Food products*

*Plastics & resins*

- **Common allergens:**

*Nickel, chromate, cobalt, gold & mercury salts*

*Rubber accelerators & antioxidants*

*Organic dyes*

*Plastics & resins*

*Industrial biocides & germicides*



Source: WorkSafe Australia 1989, *National Strategy for the prevention of occupational skin disorders*, Aust, Govt, Printing Service, Canberra, pp5-6

fl painter in northern Hanover  
 Was told bu police to pull over  
 He acted quite drunk;  
 His breath really stunk;  
 flnd he'd solvent-based rashes all over.



# How's your magnetism?

## Working in magnetic fields

*Welders are exposed to high magnetic fields, as are railway workers, crane drivers, panelbeaters and electricians. Surprisingly, postal workers and shop check-out personnel are also exposed to magnetic fields.*

More and more findings suggest that low-frequency magnetic fields are a health risk.

A recent Swedish study involved more than 1,000 randomly selected workers on various workplaces, ranging from office personnel to engineers and railway conductors. Each person was required to wear a dosimeter which measured the magnetic fields around the person during the day.

The result of the study is presented in the table below. The occupations mentioned in the table were exposed to strong magnetic fields, both in terms of the average exposure during the day, the median value, the peak value, and the portion of the day when the exposure exceeded 2 microtesla ( $\mu\text{T}$ ).

Train drivers were not evaluated in the study.

High exposure values are rare in the workplace. Three quarters of the surveyed workers were exposed to less than  $0.16 \mu\text{T}$  (median value). The average daily exposure value was higher: over  $0.2 \mu\text{T}$  for more than 40 per cent of the group.

The survey only included male workers. The exposure for female workers is probably quite different. Women are more commonly exposed to longer lasting magnetic fields, but with less dramatic intensity.

The purpose of the survey was to lay the groundwork for further research, such as comparing the incidence of cancer in the high exposure groups versus the low exposure groups.

A long list of magnetic field sources was also compiled, containing over 2,500 different sources. Hand tools for metal work proved to be high on the list, as did machines used in the manufacture of wood products. The highest values were produced by saws, routers, drills and similar hand tools. Sources of  $0.2 \mu\text{T}$  or more during a third of the working day included machines used in grocery stores, electrical work, bakeries and restaurants.


It is hoped that the results of the study can contribute factors of interest to sanitation of the electrical work environment.<sup>(1)</sup>

## Train drivers and magnetic fields

Train drivers suffer a greater risk of leukaemia than the average person. However, the

## ELECTROMAGNETIC FIELDS

HIGH	<b>exposure occupations</b>	
	Welders	Shop workers (some)
	Railway conductors	Crane operators
	Postal workers	Electricians (installation, operation, machine)
	Chemical engineers and technicians	Panel beaters
LOW	<b>exposure occupations</b>	
	Construction machine drivers	Vehicle drivers
	Health care workers	Secretaries & receptionists
	Concrete workers	Telephone repair & installation workers
SOURCES	<b>of magnetic fields</b>	
	Electric welders	Locomotives
	Soldering irons & heat guns	Signal boxes, shunting boxes
	Cutting machines	Power stations
	Chain saws	



risk of contracting brain tumours (astrocytoma) is no higher in train drivers than in other people.

This was the conclusion of a recent research project conducted by the Karolinska Institute in Stockholm. More than seven thousand locomotive drivers and over two thousand stationmasters were compared with the general population. The number of cancer cases was no greater in the railway workers than in the rest of the population.

However, the leukaemia cases in railway workers were double than expected. The type of leukaemia is a non-fatal kind. The result is corroborated by earlier studies, and there is a distinct correlation between dose and response.

Further studies will concentrate on the type of locomotive driven. It has already been shown that the magnetic field patterns and strengths vary depending on where the engine is located.

## Schools and day care centres

Children are particularly sensitive to electromagnetic fields. A level of  $0.2\mu\text{T}$  or more has been shown to double the incidence of leukaemia in children. It is therefore worrying, that many schools and day care centres are situated near or under electrical power lines. Swedish authorities are concerned about schools and day care centres situated closer than 120 metres from a 400,000 volt line, 85 m from a 220,000 V line, 40 m from a 70,000—130,000 V line, and 15 m from a line carrying 10,000—40,000 volt,

New school construction projects are expected to keep away from power lines. However, existing schools and day centres would not be affected, since the cost of moving the buildings is much too great in relation to the health risks, according to the Swedish electrical safety authorities.<sup>(2)</sup>

## Effects of electromagnetic fields

It has now been established that locomotive drivers and train conductors are three times more likely than the general population to contract cancer of the pituitary gland. The risk is also clearly greater of getting male breast cancer. The Swedish National Institute of Occupational Health recently presented a new survey of the work environment of train workers. The study encompasses all men who were employed as locomotive operators and conductors between 1960 and 1979.

While the level of brain tumours was normal by and large, the risk of lymphatic leukaemia was doubled, and tripled in the case of pituitary cancer.

Birgitta Floderus of the Institute believed that chance played no part in the findings, since the incidence of cancer was so significant. Furthermore, earlier research has pointed to the same increased risk. A Norwegian study also showed that the risk of male breast cancer was increased.

The risk was greatest during the first ten years of employment, according to the study.

"It is likely that the effects can be detected in young people," Ms Floderus said, "If you've managed to work as a locomotive driver or a welder for ten years, you will also manage another thirty years."

Ms Floderus believes that the electromagnetic fields affect the hormones in some way, since the pituitary gland governs the production of hormones.

However, there are many questions. What factors are important? What is the mechanism? What are the frequencies, what is the exposure level?

A major French-Canadian survey is currently underway which, it is hoped, will shed new light on a serious work environment problem,

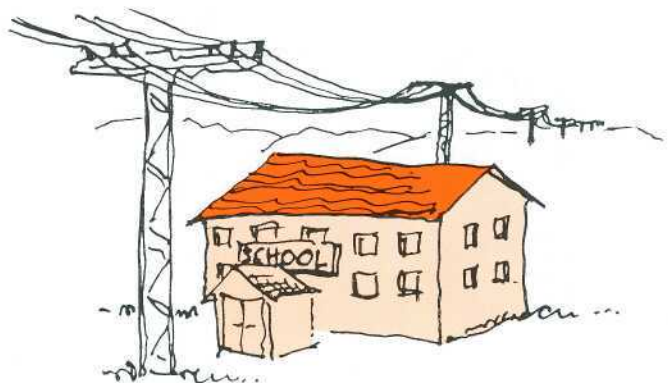
Not surprisingly, train workers want the research to go ahead, and wish something to be done about the high levels of electromagnetic exposure.

A Finnish report states that the electromagnetic fields vary greatly, but are at their highest levels when the train engine is accelerating.

Locomotive drivers and conductors are exposed to  $0.9\mu\text{T}$  during the working day, according to the report. The peak values were  $22.5\mu\text{T}$ . The Institute considers values above  $0.2\mu\text{T}$  to be abnormally high, and therefore could be an increased cancer risk.<sup>(3)</sup>



Source: <sup>1</sup>Ekelöf, E. 1994, *Arbetsmiljö* No 2, p11; <sup>2</sup>Lundgren, H. 1994, *Arbetsmiljö* No 12, p11; <sup>3</sup>Ekelöf, E. 1993, *Arbetsmiljö* No 12, p12



# Tools of the Trade

The selection of hand tools is a very important consideration. It is essential to choose a tool that not only does the job effectively, but that also fits the hand that works it. In short, a hand tool is as individual as the hand itself. Particular tasks and work positions also play a big role in the selection.

Whether you're selecting a tiny screwdriver or a heavy pipe wrench, ask yourself the following questions:

- **Do I like the size of the tool?**
  - *Is it too large?*
- **Do I like the weight?**
  - *Is it too heavy?*
- **Do I like the balance?**
  - *Is it too heavy in the front?*
  - *Is it too heavy in the back?*
- **Do I like the size of the handle?**
  - *Too long?*
  - *Too short?*
  - *Too thick?*
  - *Too thin?*



■ **Do I like the shape of the handle?**

- *Is it too rounded?*
- *Too square?*

■ **Do I like the surface of the tool?**

- *Is it a good texture?*
- *Do I need insulation against heat/cold?*

■ **Do I like the way it handles?**

- *Do I need a two-hand grip?*
- *Is it flexible enough for my purposes?*

■ **Do I like the performance?**

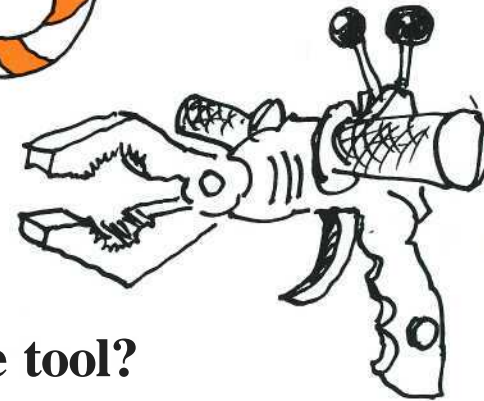
- *Will it do exactly what I require of it?*

■ **Do I like the way it looks?**

- *Good design?*
- *Good colour?*
- *Easily identified?*

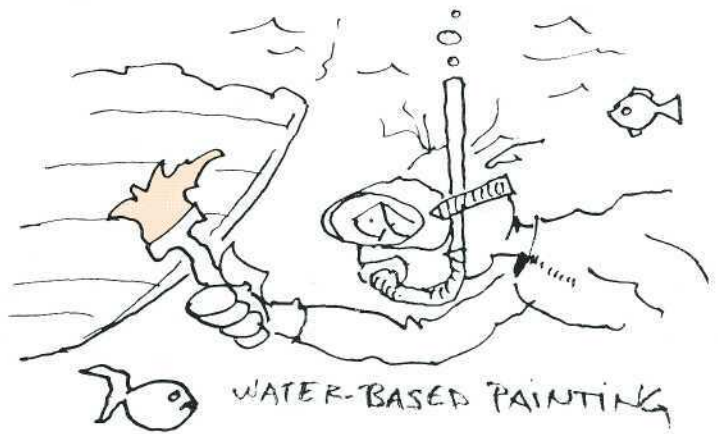
■ **Do I like the service and maintenance of the tool?**

- *Any specific maintenance/cleaning requirements?*





# Water off a painter's hands



## Water-based paints — are they safer?

*Painters work a lot with their hands, not only while applying the paint, but also in cleaning and preparation of surfaces, and in finishing and detailing after completing the paint job. Water-based paints have become a popular substitute odor solvent-based types. But water-based still have some health effects — mainly on the skin.*

A recent study from Sweden has shown that dry, sore skin and other skin conditions are common among painters who use water-based paint.

A painter's job is largely done with the hands. Preparation of paint surfaces, paint application and wallpapering are the main work procedures. Most of the work is done with hand-held tools.

A painter is exposed daily to paints, glues, lacquers, putties and many other substances.

During the 70s, research into the health effects of solvents on the nervous system progressed rapidly, as did the general awareness of the dangers associated with solvent exposure. In addition, painters often developed contact eczema from their work with solvent paints. Water-based paints became more and more common as a result, especially in interior painting. However, in industrial applications, solvent-based paints are still commonly used.

## Positive step

The change to water-based paints has been a very positive development for painters. However, change-overs to new materials often lead to worries and uncertainty, which has also been the case among painters: the suspicion and fear of the unknown. Painters commonly complained of headaches, throat irritation, nausea and increased amounts of urine. There has also been concern regarding contact allergies caused by chemicals contained in water-based paint preparations.

In Sweden, 47 per cent of painters who quit work for reasons other than retirement do so because of health problems, 24 per cent quit because of worries about health, 17 per cent of health-related resignations state eczema or asthma as the major cause.

However, most painters (about two thirds) consider themselves in better health since they started to work with water-based paints. Under two percent believe that solvent paints are less harmful. But working with water-based preparations is not all rosy: about a third of painters experience skin conditions, such as dry skin, itchiness and eczema.

## Not entirely solvent-free

Water-based paints still contain certain amounts (about 5—7%) of solvents. Common solvents used in this type of paint are propylene glycol, hexylene glycol, texanol, butyl glycol and butyl di-glycol.

Ammonia and volatile amines may also be used to adjust the pH-level of the paint. Because of the possible risk of explosion, ammonia is being phased out.

Apart from pigment, binding agents, fillers, thickeners and solid particles, water-based paints also contain preservatives, and may have anti-corrosion agents included in the formula. Certain preservatives, such as isothiazolinones, are believed to be the major culprits when it comes to contact allergies.

## Likely effects

The various ingredients in the paint are believed to have varying health effects. Here is a brief list of the most important constituents in water-based paint, and their respective effects on the human body (keep in mind that these effects are mild and of an acute nature):

### • Organic solvents

*headache*

*eye irritation*

*enlarged red corpuscles*

*liver damage (hexylene glycol)*

*raised blood pressure*

- **isothiazolinones**  
*increased urine*  
*raised blood pressure*
- m **Ammonia**  
*enlarged red corpuscles*  
*raised blood pressure*

## Risks are low

Painters who use water-based paints are no more likely to develop hand eczema than other occupations, and the painter's job is not particularly hazardous when it comes to contact allergies. However, there are steps that can be taken to further decrease the risk. For instance, the use of the offending preservatives could be discontinued,

Painters should keep a few points in mind when working with water-based paints:

- **Avoid skin contact with paints, glues and putties as much as possible**
- **Use textile gloves**
- **Use paints with as low levels of preservatives as possible (some paint manufacturers apply sterile production processes, which minimised the need for preservatives in the paint)**



**Source:** Fischer, T., Bohlin, S., Edling, C., Rystedt, I., Wieslander, G. 1993, 'Skin disease and contact sensitisation in industrial painters chiefly using water-based paints', *Arbete & Halsa* No 1993:21, Swedish National Institute of Occupational Health; Lewné, M., Hultengren, M., Rosen, G. 1994, 'Occupational hygiene risks of surface treatment in the wood industry', *Arbete & Halsa* No 1994:1, Swedish National Institute of Occupational Health

# A sensitive matter

## Sensitisation — how does it work?

*Skin allergy comes in several guises, ranging from simple rashes to more severe allergic conditions. How does sensitisation work?*

### m Rapid reactions

The "common" skin allergy is a rapid onset of skin rashes, often accompanied by sneezing (hay fever). This type of allergy is called **Rapid hypersensitivity reaction — Allergy I.**

The reasons why some people develop this sort of allergy are still unknown. Affected people have developed a special type of antibodies, called **IgE-antibodies**, which react against proteins and other large molecules in the environment. The antibodies coat certain cells in the tissues (mast cells and basophilic granulocytes).

When the antibodies come into contact with their respective allergens through skin contact, inhalation or ingestion, they release active substance, such as histamine. The reaction is very rapid, and the familiar allergic symptoms (hay fever, nettle fever, asthma) occur within minutes.

### • Delayed reactions

Becoming **sensitised** to a substance is a different process altogether. This type of contact allergy is called **Delayed hypersensitivity reaction — Type IV allergy**. This is caused by low-molecular compounds, such as nickel and formaldehyde. This type of allergy occurs in two stages.

In the initial stage, the person comes in contact with the substance, which is taken up in special cells called **Lagerhans cells**. These are macrophage-like cells in the skin.

Once the Lagerhans cells have encountered the allergen, they migrate to the nearby lymph nodes, where they "present" the allergen to T-lymphocyte cells. The T-lymphocytes start to divide, "remembering" the characteristics of the allergen. In other words, they become specialised cells, activated by the particular allergen.

In the secondary stage, that is, when the cells are again exposed to the allergen, they recognise the allergen. Now, they start to produce certain substances called **lymphokines** that cause local inflammation of the skin: the result is allergic contact eczema. This type of reaction usually occurs 12–48 hours after exposure.



**Source:** Astrand, I., Gronkvist, L., Lagerlof, E. 1992, *Research for a better working environment*, Sweden's National Institute of Occupational Health

Training is silver...  
Attitude is gold!



# Don't smoke and drive!

*A combination of tobacco smoking and diesel exhaust increases the risk of lung cancer almost thirty times, according to a new study.*

The study involved storers and packers from 15 different ports, and the main problem were the diesel-fuelled forklift trucks in the workplace, according to Brita Beije from the Swedish National Institute for Occupational Health.

The workers were divided into three groups, depending on how long they had been working: under a year, 1–5 years, and 6–16 years on the job.

Mid-term workers who did not smoke showed an increased risk of lung cancer of 1.6, while non-smokers with more than 6 years on the job stood an increased risk of 3 times,

Smokers, however, were dramatically more at risk: in the middle group, the increase was 10 times, whereas in the 6–16 group, the risk was thirty times higher.

Ms Beije admits that there might be some uncertainties in the actual data. Even so, the increased risk in smokers exposed to diesel fumes is obvious.

## Substitute diesel vehicles

A safety consultant with long experience in storage and warehousing advocates a departure from conventional diesel forklifts and more widespread use of electric vehicles. Bengt Peterson says that forklift drivers risk higher incidence of lung cancer for no reason.

Although battery-operated forklifts enjoyed great popularity in the mid-seventies and onwards, until about half of all forklifts sold were electric, sales have now stagnated, despite the arrival of new, more effective models.

Marketers and manufacturers of diesel-fuelled forklifts are often unable to give any indications of the type and concentration of exhaust gases, claims Mr Peterson. Although the vehicles often are intended for use indoors, many sales are based on vague terms such as "environmental diesel" and catalytic exhaust cleaning.

Mr Peterson questions the ability of an employer to say that a diesel vehicle can be used indoors, when no levels of exhaust and harmful substances have been ascertained.



He also wonders how many forklift manufacturers could assess what ventilation rates are required, based on the vehicle's exhaust,

New engine designs and fuel with lower levels of exhaust have cut the exposure to the drivers, Mr Peterson admits, and particle filters, correctly used, can further limit the exposure. However, the level of nitrogen oxide in the exhaust gases still determined the need for adequate ventilation. To bring up the subject of catalytic units is futile, claims Mr Peterson, since such units only mean a greater concentration of nitrogen oxide.

Diesel drivers are among the high risk group when it comes to occupationally induced cancer. Mr Peterson thinks it is time to react. He wants more responsible action. He places the onus on marketers, manufacturers and safety officers.



Source: *Arbetsmiljö* 1994, No 5 p 15; Peterson. B. 1994 (ibid. p 22)

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# Are you H, M or L today?

*Are your ear muffs adequate? Or are they too effective, taking out useful noise as well? Assessment of hearing protectors becomes easy with the new soon-to-be international HML method*

There are three factors that determine the required qualities of a hearing protection device:

- **Attenuation**  
(the ability to absorb and dampen noise)
- **Useful noise admission**  
(the ability to let you hear what's going on in the surroundings, such as emergency sirens, communication with workmates, verbal warnings and instructions etc.)
- **Comfort**  
(the ability to keep your skin, head and ears comfortable even if you're wearing hearing protection a/l the time)

It is, of course, important to select hearing protectors that will cut the noise that reaches your ears to a safe level. They must therefore have adequate attenuation to deal with the surrounding noise,

But the real "trick" is to stay away from protection devices which over-protect. Too effective ear muffs become heavy and awkward, may give you a sense of isolation, and may cut out useful noise along with hazardous noise,

The HML method stands for the protection device's attenuation at High, Medium and Low frequencies. Ideally, every hearing protector sold should carry the three HML values for easy assessment by the user.

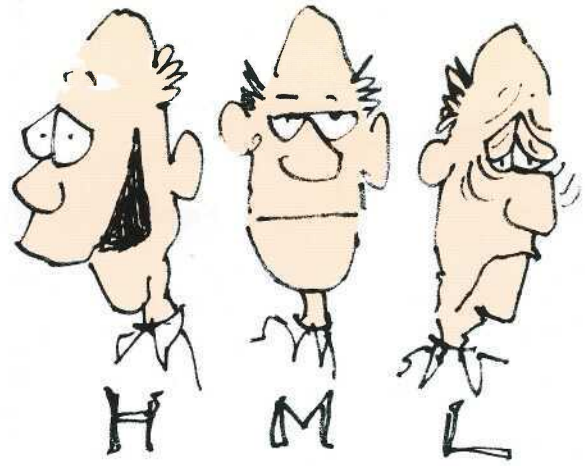
By measuring the A-weighted and C-weighted noise levels in the workplace and applying them to the HML values of the hearing protection devices, selection of the correct type becomes a very simple procedure.

Here is an example:

Your ear muffs have an H value of 24 dB, and an M value of 20 dB,

In the HML table, draw a line between 24 in the H column, and 20 in the M column,

A noise measurement of your workplace has shown that the dB(A) is 97, and the dB(C) is 98.



Therefore, the difference between the two noise values is 1 dB.

All you have to do now is to read the value at the point where the line you drew crosses the 1 dB column. The value is 21, which means that the noise level inside the ear muffs, in this case, is  $97 - 21 = 76$  dB(A).

## International acceptance

The HML method has been created over several years, and has gained much acceptance in the safety industry. The method is expected to be adopted as international standard.

Ready-reckoners and simple HML calculators are available from several manufacturers of hearing protection devices,



Source: Arbetsmiljö 1993, no 6 p 9.

Attenuation index of hearing protectors according to the HML-method.

Attenuation index (PNR)									
H									M
40	40	40	40	40	40	40	40	40	40
38	38	38	38	38	38	38	38	38	38
36	36	36	36	36	36	36	36	36	36
34	34	34	34	34	34	34	34	34	34
32	32	32	32	32	32	32	32	32	32
30	30	30	30	30	30	30	30	30	30
26	28	28	28	28	28	28	28	28	28
26	26	26	26	26	26	26	26	26	26
24	24	24	24	24	24	24	24	24	24
22	22	22	22	22	22	22	22	22	22
20	20	20	20	20	20	20	20	20	20
18	18	18	18	18	18	18	18	18	18
16	16	16	16	16	16	16	16	16	16
14	14	14	14	14	14	14	14	14	14
12	12	12	12	12	12	12	12	12	12
10	10	10	10	10	10	10	10	10	10
	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2
	(L <sub>C</sub> -L <sub>A</sub> )								

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SURFACE  
MAIL

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AUSTRALIA

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## Summary

### ■ NZ printers phase out solvents (page 1)

*In a positive initiative, the New Zealand printing industry have decided to eliminate seven common solvents out of 32 that are banned elsewhere in the world.*

### ■ Bakers bite the dust (page 2)

*A Danish study finds that bakers suffer from asthma two to three times more often than the rest of the population, which corroborates similar findings in other countries.*

### ■ Skin facts (page 3)

*Common occupations, substances and allergens that affect the skin.*

### ■ How's your magnetism? (page 4)

*More occupations than you think may be exposed to high magnetic fields. New research projects are trying to find a correlation between diseases such as leukaemia and strong electro-magnetic fields. Some countries are becoming concerned with children being exposed to such fields in schools situated near power lines,*

### ■ Wallchart (pages 6—7)

*Important points when choosing a hand tool,*

### ■ Water off a painter's hands (page 8)

*Water-based paints have provided a great alternative to conventional solvent-based products. But this doesn't mean that all possible health problems have been removed entirely. Water-based paint still contains some solvents, as well as certain preservatives that can cause skin problems. Painters should maintain sensible work routines and handling procedures.*

### ■ A sensitive matter (page 9)

*Allergic sensitisation is quite different — and a lot more serious — than the usual hay fever and rashes.*

### ■ Don't smoke and drive! (page 10)

*New research has established a strong connection between tobacco smoking and diesel exhaust. Forklift operators are particularly exposed to diesel fumes, and those who smoke stand a significantly increased risk of contracting lung cancer. This is not only a case for curbing tobacco smoking, but also to consider electric forklifts.*

### ■ Are you H, M or L today? (page 11)

*The HML method of assessing hearing protection is gaining international acceptance. To calculate the noise level inside a pair of ear muffs is a very simple procedure indeed.*