

# **SUBSTITUTION OF ORGANIC SOLVENTS**

**- the Danish experience**



# From Discussion.

Many employers claim that organic solvents are harmless and technically indispensable.

The Oil Industry claims that organic solvents further productivity if handled correctly.

Physicians discuss how harmful the organic solvents are.

In Scandinavia it is recognized that organic solvents may cause brain injury and other permanent damage to one's health.

All over Europe, the harmful effects of organic solvents on the environment are recognized.

The EC will not accept that organic solvents be marked with the "serious health hazard when subjected to long term exposure" warning - not even in member

states which recognize this risk. This means that workers in the EC become the guinea pigs of the industry.

# ...To Action.

Some workers have grown tired of playing guinea pigs. They have set to work on their own getting harmful compounds substituted with less dangerous ones.

This folder gives you three cases from Denmark which have had an international impact. Three workers who have themselves been active tell of how they have gone about it and which problems they have encountered. The cases are meant as a request for other workers, unions and work environment consultants to get on with it themselves. The cases prove that it can be done.

# The paint became waterbased

**Benny Christensen – house painter, formerly active in the safety committee of the House Painters' Union in Copenhagen, founder member of "Action Group Workers and Academics" (with the Danish acronym : AAA) in 1975 and presently employed at the Labour Inspection in Copenhagen as a construction consultant:**

– We became interested in substitution in the house painting trade when it became common practice to use the alkyd paint for the big surfaces in building. This was back in the fifties and sixties.

## Headaches

Almost all of us experienced headaches, felt tired when we got back from work, were edgy etc. We suspected that solvents might cause permanent harm but back then we did not have the medical research to support our suspicions.

In the House Painters' Union, we set up a so-called "toxics committee" in 1969. We knew

that there were alternatives to the alkyd paint. Emulsion paint was known at the time although not in common use. Additionally, there were technical problems – particularly for outdoor use.

Actually, we only demanded that the technological development considered our health. But it was necessary to create a pressure to have the demand met. We used several ways to create the necessary pressure :

## The painters' reports

In the first place, we co-operated with medical students and other university people. In 1972 this led to the publication of a "Painters' Report" both in Aarhus and Copenhagen.

Secondly, we used our trade unions. At meetings in the local branches we passed a motion to refuse working with alkyd paint, to use emulsion paint where possible. And we put it into practice, for instance, in the construction of a large housing estate.

The master painters were not

against our demands but, of course, interested in avoiding work stoppages. Quite often, they themselves were hard hit by the adverse effects of the alkyd paint. The activities resulted in a co-operation between the Master Painters' Guild and the House Painters' Union to visit work sites.

When later we received medical documentation that you may become brain injured by alkyd paint, cases were brought before the National Occupational Injury Agency. In 1976, this body recognized the first case of brain injury and the first colleague was awarded damages for what henceforth was known as the "Painters' Syndrome".

## **Less harmful**

We had now won recognition in the "system", but it turned out to be an equally arduous task to convince our own colleagues that it is possible to substitute alkyd paint with water-based paint.

We demanded something which was less harmful. We never claimed that emulsion paint was harmless. It contained small quantities of solvents, small quantities of formaldehyde etc.

The paint industry was pressured into concentrating their efforts on being first on the market with water-based alternatives. Also the legislation was improved

so that the demand for substitution became an important part, and health and safety considerations were to be present even in the planning stages of a construction project and in the choice of materials.

## **New technique**

We think that we succeeded. So well that apprentices today no longer learn to paint with alkyd paint. After all, it is not only a question of substituting one paint substance with another. The technique and the tools are different. Alkyd paint must be applied with heavy strokes of the brush, whereas with emulsion paint you practically have to place it on the surface.

We learned the importance of getting one's priorities right. There were several work environment problems but we chose to say that the white spirit must go. It was a problem that everyone literally felt. The majority was subjected to a massive dose every day and wanted to get rid of the headache.

## **Technology and health**

The building contractors and masters were forced to realize that they just cannot treat people as they please. And the paint industry had to recognize health and safety considerations in the technological

development.

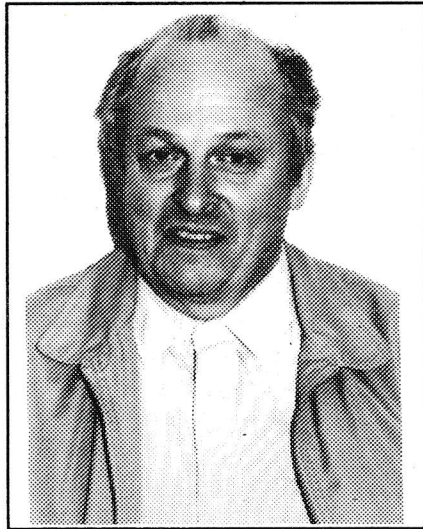
We have never tried to make anyone believe that we could solve all problems in one go but our demands became part of the technological development in our trade. It is a question of developing the technical quality while the work becomes less harmful to your health.

The house painters keep up their pressure on the paint

industry. Recently, we had a new Painters' Report made which deals with some of the problems concerning water-based paints.

We must not be satisfied with having taken a big step along the way but must continue to create a development towards a safe and healthy work environment. That is why you should remain skeptical towards the materials you are working with.

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*Our demands became part of the technological development in our trade, says Benny Christensen*



# Healthier degreasing in the metal industry

**Steen Sjøland, shop steward in  
the electronics company  
Radiometer in Copenhagen and  
committee member of AAA:**

- The iron and metal industry uses large amounts of organic solvents. They are used for degreasing, in coolants, for removing flux residues from printed circuit boards, in glues, enamels, paints and for many other purposes.

Today, alternatives can be found in all these areas but the development has shown us how important it is to consider both the work environment and the environment in general when planning a substitution.

## **CFC – a poor substitute**

Some years ago, abandoning trichlorethylene because of the health hazard became common practice. CFC (freon) was introduced for degreasing and cleaning printed circuit boards.

Today, we know that CFC contributes strongly to the depletion of the ozone layer. Furthermore, CFC may have the same brain damaging effects as other organic solvents. Conse-

quently, it was a poor substitute.

An international agreement (The Montreal Agreement) calls for a halt to the use of CFC before the year 2000 out of consideration for the ozone layer. In Denmark and several other countries, the governments want to stop the use already in 1995. A number of different substitutes exist but it would be an extremely bad choice to return to the chlorinated solvents.

To examine the alternatives, in 1989 the National Agency of Environmental Protection together with "Elektronikcentralen" (a partly state subsidized research body) initiated a project. It was called "Methods for reducing the use of CFC in the electronics industry". I personally participated in an associated group as representative of my trade union, the Danish Metal Workers' Union.

## **Use water**

The project ended with a report in May 1992. It concluded that it is possible to use water for cleaning or avoid cleaning entirely after the soldering of printed circuit boards.

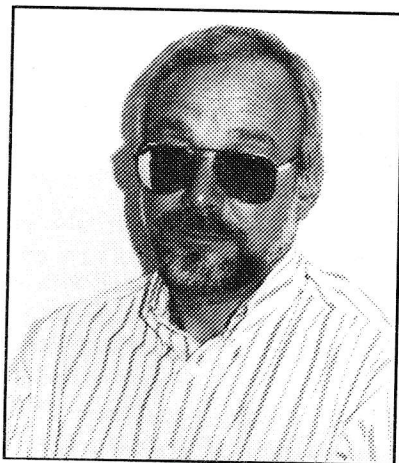
Once again, the report confirms our fundamental belief that there are no environmental problems which cannot be solved if there is a will and sufficient funding.

## People refused

Another example tells more about our courses of action on the shop floor : Some years ago, my company tried to introduce a highly potent organic solvent for cleaning lathes. It was to be run through the machines at night. In the morning, it turned out that much of the paint on the machines

had simply disappeared. The outcome was that people refused to use the solvent, so the company had to return it to the supplier.

On the whole, it must be said that courses and information about the importance of substituting organic solvents in the metal industry has changed the attitudes of many people in our jobs in a positive direction. Today, degreasing of metal workpieces are done with water in many places, for instance in washing machines. The open vats with "tri" (tri-chloroethylene) of former times are seldom seen.



*Steen Sjøland was a member of the follow group of the project "Methods for Reducing the Use of CFC in the Electronics industry".*

# Printers developed vegetable solvents

**Kaare Rand Hendriksen, skilled printer. Participated in the development of vegetable oils for cleaning in offset printing houses. Member of AAA.:**

- The reason that we started was the large number of brain injuries among our colleagues. From 1980 to 1990, we had 596 reports of brain injuries among those who worked with printing machines. And in 1990 this group constituted approximately 5600 people.

Some of us knew that you could use alternatives to organic solvents, e.g. margarine or soya-bean oil. Vast amounts of solvents are used for cleaning back pressure cylinders, rubber blankets and rollers in the printing trade. The printers themselves are involved in purchasing cleaning agents and if they do not choose the less hazardous alternatives, it is because they were formerly more difficult to work with.

We decided to develop a product, based upon vegetable oils, which was easier to work with.

We were three teachers from a technical college who applied for

and were granted funds from the National Agency of Environmental Protection. Unfortunately not for developing alternatives but for documenting that the alternatives do not harm man nor machine. We found this absurd since it is known that the organic solvents harm man as well as machine.

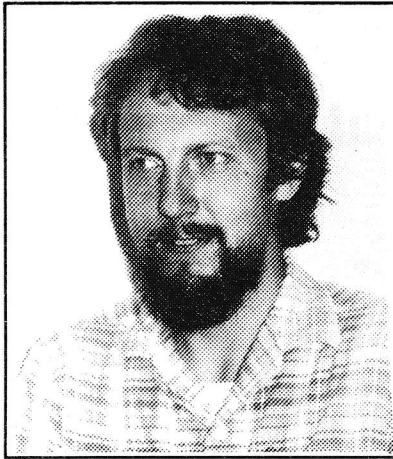
Our experience from the project leads us to advice against the use of pure soya-bean oil. It can ignite spontaneously and it can destroy the bearings of the machines.

On the other hand, the new products which we - and others - have developed have a lubricating effect on the bearings of the machines.

A number of Danish printing houses have decided to switch to cleaning with the new vegetable products. But I would like to explode the myth that the employers have put up the greatest resistance. The crucial battle is to get our colleagues on the shop floor to change their attitude and start using the new products.

The fact that there is an alternative to the harmful substances does not suffice. What





*You do not just substitute one substance with another, you have to learn new manual processes, says Kåre Rand Hendriksen.*

is needed is a gigantic educational campaign to get people to choose it instead of the old well known ones.

### **New methods**

Of course, the ideal situation would be for the authorities to demand that only the less harmful substance be used. One must bear in mind, however that what is needed is a change in working methods. You do not just substitute one substance with another. The manual working processes are different and, consequently, one has to learn the new methods before the result becomes satisfactory. It is a process which may take a while.

The knowledge of the new solvent was disseminated through

the European Conference on Work Environment in Copenhagen in 1990 and was adopted by printers and work environment consultants in Germany, England, Scotland and Spain.

During a half year period, a number of offset printing houses in Hamburg carried out an experiment with vegetable oil. The outcome was positive and made the local Labour Inspection Authorities recommend a general transition to vegetable oils in offset printing.

We have now received funding for an inter-European SUBS-PRINT project concerning transfer of this – cleaner – technology to other European countries. It is a joint project between Denmark, Germany, Spain and possibly a number of additional countries.

# SUBSTITUTION – one way to a healthier work environment

The extensive experience of various trades and groups of workers show that substitution is an efficient method to an improvement of the work environment.

\* The problem must be solved at its source. Not by adding new cleaning processes, ventilation or personal protection aids.

\* Problems in the work environment as well as in our natural environment must be solved as a whole.

\* The solution may consist in removing a chemical substance started recording and limiting the number of chemical substances. This, per se, has brought about positive results such as savings on the purchase account. Another positive effect has been an increased knowledge among employees about the things they are working with and their effects. This, of course, presupposes that there is complete frankness about the substitution process such as

access to all information concerning the health hazards of every alternative which is to be evaluated.

Our experience tells us that it is important to begin by asking the right questions :

– *What is the purpose of the work process?*

– *Might the process be omitted entirely?*

– *Might the same object be obtained through other – harmless – processes?*

– *Might other materials be used?*

Traditional methods in work environment efforts ask only whether the limit values for the concentration in the air have been exceeded. This has proved to be insufficient. Substitution is a more progressive, democratic and

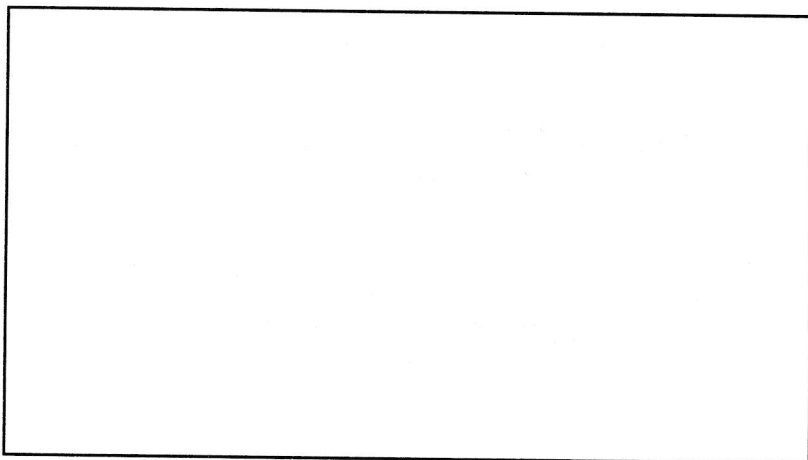
systematic way of solving chemical work environment problems.

### **Would you like to know more?**

This folder has been published by The European Network for a Better Work Environment, which consists of workers, safety re-

presentatives, trade unionists and consultants from, so far, 13 European countries.

We hope that it has inspired you to get on with creating a better work environment in your place of work. If you would like to know more about the experience with substitution of organic solvents, contact the European Work Environment Network through :



DET · EUROPÆISKE  
ARBEJDSMILJØÅR | 1992

arbejdsmiljø uden grænser

# I SOLVENTI ORGANICI

POSSONO PROVOCARE DANNI AL CERVELLO. POSSONO INQUINARE L'AMBIENTE.  
SI POSSONO SOSTITUIRE

# LOS DISOLVENTES ORGANICOS

PUEDEN CAUSAR DAÑO AL CEREBRO. PUEDEN DAÑAR EL MEDIO AMBIENTE  
PUEDEN SER SUSTITUIDO.

# ORGANIC SOLVENTS

MAY CAUSE BRAIN DAMAGE. MAY HARM THE ENVIRONMENT.  
MAY BE SUBSTITUTED.

# ORGANISCHE LÖSEMittel

KÖNNEN HIRNSCHÄDEN HERVORRUFEN. KÖNNEN DIE NATUR ZERSTÖREN.  
KÖNNEN ERSETZT WERDEN.

# ORGANISKE OPLØSNINGSMIDLER

KAN GIVE HJERNESKADER. KAN SKADE NATUREN.  
KAN ESTATTES.

Three danish workers - a housepainter, a metal worker and a printer -  
tell of their own involvement in the substitution process.  
Substitution is a more democratic, more systematic and more progressive  
way of solving chemical work environment problems.

This pamphlet and the poster with the above text is part of  
the European campaign for substitution of organic solvents.  
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The European Network for Better Work Environment.

Eget tryk.