Solvent emissions from the UK adhesives industry and air pollution.

N.R. PASSANT
using high solids adhesives (less than 250g organic solvent per kg of solids). Fugitive emissions (ie emissions from uncontrolled sources) will have to be minimised. Manufacturers have to meet a 50 mg/m³ emission limit for emission sources where the mass emission of organic solvent exceeds 1kg in 8 hours. Both manufacturers and users are required to monitor emissions periodically, and an inventory of solvent use must be kept for inspection by the local authority. The guidance notes also set out a number of requirements for handling of solvents and general good housekeeping.

6. Abatement options.

In order to comply with the emission limits set by the Environmental Protection Act, processes will have to adopt one of two approaches. Either they must abate emissions from stacks using end of pipe technology such as incineration or adsorption; or they must change to water based, low solvent or high solids adhesives so the emission does not occur in the first place. The route chosen will depend to a certain extent on the size and nature of the process.

6.1. Abatement options for adhesives manufacture.

Both abatement of emissions by end of pipe technology and good housekeeping, or reformulation of products to reduce solvent content are options for manufacturers. Abatement of emissions has the advantage of allowing the manufacturers to continue to make and sell their solvent based formulations. Reformulation to low solvent or no solvent adhesives will involve greater disruption to industrial activity but will have the important effect of preventing the need for adhesives users to fit abatement equipment. However coating methods and plant may need to change for reformulated adhesives. In the Netherlands some producers have done much research into low-solvent adhesives. Generally it can be said however that the progress in the development of low solvent alternatives is not as rapid as, for example in the paint sector. Substitution by water-borne dispersion adhesives seems to be the most promising. However the use of hot melt adhesives which contain little or no solvent, is also increasing. These types of adhesive are used in pressure sensitive and non-pressure sensitive adhesive formulations and are being used in bonding operations varying from automobile structural applications to appliance assembly and packaging.

At this moment a lot of possible alternative adhesives are not yet in production or, when the adhesives are already produced,
can hardly compete commercially with high solvent equivalents. Reasons for this are:

- many potential clients are not prepared to use alternative adhesives without information about these adhesives or the incentive to buy them.
- producers may have to develop new processes and technologies for the production of adhesives and industrial clients have to change their application machine.
- some alternative adhesives have certain disadvantages, which are as follows:

Adhesives with a lower solvent content often have a longer setting time and for that reason they are difficult to use in mass production. In some cases low-solvent adhesives have somewhat less sticky properties than their high-solvent equivalents.

Water based adhesives have a longer setting time, less water resistance, and impracticable application in freezing conditions.

Substitution by hot-melt solid powder adhesives has the following consequences: sensitivity to high temperatures and embrittlement at lower temperatures, they have the advantage of ease of application and rapid setting time.

The level of control employed by the industry at present is unknown.

6.2. Abatement options for industrial users.

The industrial users of adhesives encompass the entire range of industrial processes and scale of operation. The most applicable option for emission control is greatly dependent on the size and type of operation. Sophisticated end of pipe abatement is an option for large automated coating operations, but clearly is not viable for small operations with adhesives possibly being applied by hand. Switching to alternative adhesives would therefore be the best option for small operations.

Some producers in the Netherlands have developed low-solvent adhesives for several application areas. For the following areas low-solvent or solvent-free adhesives have already been developed:

- packing adhesives
- building adhesives, including primers
- flooring adhesives, including primers
- paper adhesives
- tile adhesives
- joiner's adhesives
- wall and ceiling adhesives