

INDUSTRIAL HYGIENE

viewed) Detergent-and-water cleaning solutions can be considered for use in place of organic solvents Benzene can be replaced by toluene in most lacquers, synthetic-rubber solutions, and paint removers Natural rubber cements with aliphatic hydrocarbon solvents can perform virtually the same function as benzene cements The felt-hat industry has controlled the hazard of mercurialism by substituting mercury-free caroting materials Foundries using parting compounds that contain free silica can minimize the silicosis hazard by substituting relatively harmless powders Sandstone grinding wheels have been largely replaced by artificial abrasive wheels usually made of aluminum oxide.

Changing the process

In some cases, a process can be modified to reduce the exposure to a dust or fume and thus markedly reduce the hazard In the automobile industry, the amount of lead dust created by grinding solder seams with small high-speed sanding disks was greatly reduced by changing to hand filing Brush-painting or dipping instead of spray painting will minimize the concentration of airborne contaminants from toxic pigments Other examples of change of process are arc welding in place of riveting, vapor degreasing to replace hand-washing of parts, airless spraying techniques and electrostatic devices to minimize overspray as replacements for hand-spraying, and machine application of lead oxide to battery grids which reduced lead exposure in making storage batteries

However, mechanization may aggravate rather than decrease hazardous conditions in some instances, so process changes must be considered carefully

Isolation or enclosure

Isolation is particularly useful for limited operations requiring relatively few workers or where control by any other method is too difficult or too expensive The job is isolated from the rest of the operation and thus the majority of the workers are not exposed to the hazard The workers actually concerned with the operation can then be protected by installing a ventilation system which probably would not have been satisfactory if the operation had not been isolated and thus able to be enclosed

Enclosing the process or equipment is a desirable method of control since the enclosure will prevent or minimize the escape of solvent vapor into the workroom atmosphere Where some of the more highly toxic solvents are used, enclosure should be one of the first measures attempted, after considering substitution In most instances, the enclosure should also be exhausted to avoid buildup of solvent vapors Additional precautions must be taken when cleaning enclosed equipment or during start up or shut down in order to avoid high concentrations of solvent vapors

Enclosure of an operation effectively prevents the dispersal of contaminants Enclosed equipment is usually run tightly closed and is only opened during cleaning or filling operations Further examples of where this type of control is effective are radium dial painting, glove booths, wheelabrators or shot blast machines for cleaning castings, and abrasive blasting cabinets

In the chemical industry, the isolation of hazardous processes in closed systems is a widespread practice, which is one reason why the manufacture of toxic substances is often less hazardous than their use In the mechanical industries, complete enclosure is frequently the best solution of severe dust or fume hazards, such as those from sand blasting or metal spraying operations

Wet methods

Dust hazards can frequently be minimized or greatly reduced by application of water or other suitable liquid at the source of dust, a method often used for silica and loose dusts Wetting of floors before sweeping to keep down the dispersion of harmful dust is advisable when better methods, such as vacuum cleaning, cannot be applied

"Wetting down" is one of the oldest, simplest, and when properly used, most effective methods for the dust control Its effectiveness, however, depends upon proper wetting of the dust This may require the addition of a wetting agent to the water and proper disposal of the wetted dust before it dries out and is redispersed Tremendous reductions in dust concentrations have been achieved by the use of water forced through the drill bits used in rock drilling operations Many foundries successfully use water under high pressure for cleaning castings in place of sandblasting Airborne dust