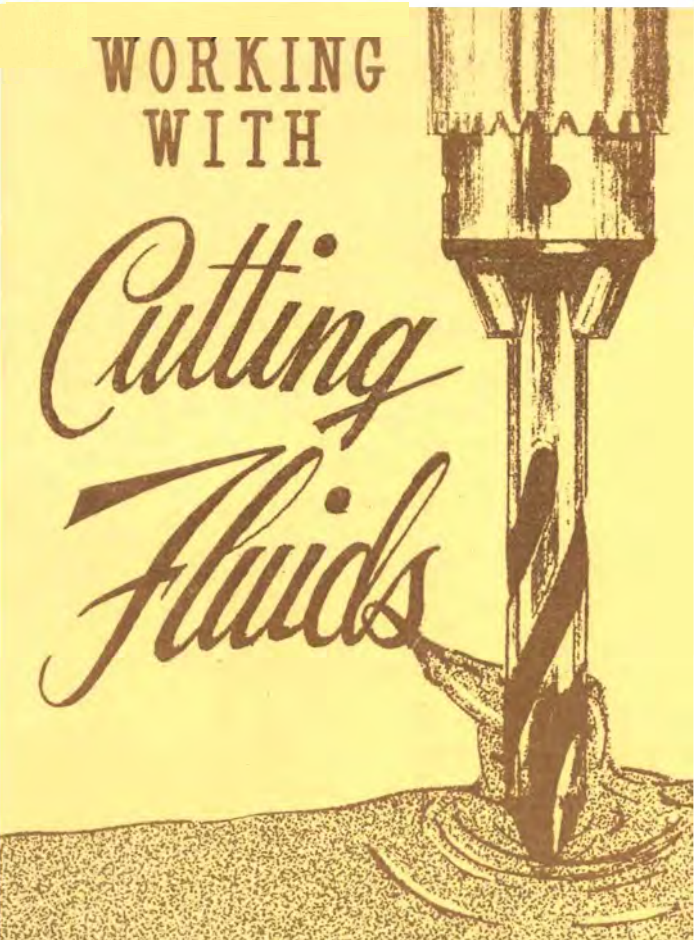
WORKING WITH

Cutting Fluids



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health

What Cutting Fluids Are

Cutting fluids are also called cutting oils, cutting compounds, lubricants, coolants, or drawing pastes. By composition there are three major types of cutting fluids: (1) straight oils, (2) emulsified oils, and (3) synthetic fluids. The straight oils are insoluble in water and may be derived from animal, vegetable, or petroleum sources. Emulsified oils are water soluble fluids which are also derived from animal, vegetable, or petroleum sources. The synthetic fluids were developed to meet the needs of modern machining practices for water soluble cutting fluids which contain little or no oil.

How Cutting Fluids Are Used

Cutting fluids are used in a variety of metal cutting and machining processes to dissipate heat and lubricate metal surfaces. Although there have been changes in cutting fluid formulations, their industrial applications and usefulness remain unchanged. Such fluids prolong rust-free tool life, permit higher cutting speeds without increased friction, and, when applied to the cutting zone, serve to capture and flush away metal chips.

How Cutting Fluids May Affect You

Cutting fluids act very much like soap upon the skin, removing surface oils and fats and causing the skin to become dry, cracked, and susceptible to infections. The materials, under some work situations, may impose health problems to machine operators; however, these problems may be eliminated if operators remain alert to the possibility of their occurrence and adhere to safe work practices.

The chief problem which results from exposure to cutting fluids is contact dermatitis caused by the oils themselves or certain additives in them, some of which are designed to suppress bacterial growth and inhibit corrosion of metals. Some of the additives occasionally used in these fluids make matters worse in that they may be primary irritants or sensitizers. Offensive additive agents may include nitrobenzene, nitrophenol, cresylic acid, some sulfur compounds, chlorine compounds, aromatic amines, and strong alkalies. Not all sulfur or chlorine additives, however, are objectionable.

Suspended particles or shavings in the cutting fluids may have an abrasive action on the skin, causing cuts or scratches. Harmful bacteria could then enter the tissues and result in infections. The hazard of such infections is greatly increased whenever sputum or other foreign waste matter enters into the circulating fluids.

Prolonged exposure to inhalation of oil mists will cause mucous membrane irritation. If the concentrations of the mist is very heavy, lipoid pneumonitis could develop from inhalation and subsequent contact with lung tissue.

How Cutting Fluid Exposures Can Be Controlled

Prolonged or even intermittent contact between the unprotected skin and cutting fluids should be avoided. The use of strong and abrasive soaps, detergents, and chemicals handled outside of work should be used with extreme caution, particularly by the more susceptible individuals.

There is no substitute for good personal hygiene and safe work practices. One of the best lines of defense is to effectively remove offending cutting fluids from the skin. Personal cleanliness is always feasible, even in the smallest shops. Waterless hand cleaner stations can be set up near the machines if hand washing facilities are remote. Waterless hand cleaners are especially useful for removal of oil; but, as with soap, care must be taken to avoid harsh cleaners. The use of raw solvent for cleaning skin must be avoided! Only mild white soap and lukewarm water should be used when washing.

Barrier or protective creams applied to clean skin will prevent contact with offending agents where the use of gloves or protective sleeves is not feasible.

Work areas should be regularly and frequently cleaned. A clean work area usually leads to better morale and results in better personal hygiene on the part of employees.

In machining operations where considerable mists or sprays are generated, precautions of safety dictated by the operation should be employed. In some cases, the use of hooded machines, splash guards, protective clothing, and eye or face shields may be sufficient. In all cases, maximum enclosure of the cutting processes should be maintained.

Whenever the fluid becomes obviously dirtied and contaminated with extraneous matter a worker's health may be at risk. For this reason, the cutting fluids should be monitored at regular intervals to check for acidity, bacterial and fungal concentration, deterioration, cleanliness, and other factors of concern.

What Effects From Cutting Fluids Should Be Reported

Any evidence of skin reaction should be brought immediately to the attention of the plant nurse or doctor. The reaction may be harmless and readily controlled. It could however, be a dermatitis that needs more intensive care. In all cases, evidence of skin reactions to offending agents should call for removal of the worker from exposure to the irritating materials until the particular cause is determined and preventive measures can be provided.

What Is Management Responsibility

The physician and work supervisor can help to prevent health injuries by informing machine operators of the hazards of cutting fluids and how to avoid them. Each work supervisor has a definite responsibility to keep the workers in his area informed, to post warning signs, and to enforce safety protection measures.

Each Worker Must

1. Avoid prolonged inhalation of mists and direct contact of cutting oils with the skin.
2. Use protective clothing, golves, splash shields and any other device as required in his work operations.
3. Use approved waterless hand cleaners or mild white soap and lukewarm water in cleansing the skin. Never use raw solvents for this purpose.
4. Use prescribed hygienic housekeeping and safe work practices. Avoid contamination or pollution of cutting fluids with any type of waste matter.

5. Cooperate with the plant physician. Report any reactions or appearance of skin disorders. Inform the doctor of any known hypersensitivity or allergy to assist him in preventing you from getting an unsightly or possible disabling dermatitis.

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