



## *Metalworking Fluid Notes*

**Description** – Metalworking fluids are compounds that lubricate and cool the work area during the cutting, grinding and forming of metals. Operations that require metalworking lubricants are as follows: turning, grinding, boring, broaching, honing, stamping, drawing and spinning.

- I. The Purpose of Keystone Metalworking Lubricants
  - A. Cool the area of interaction between the workpiece and the tool
    1. Prevents metallurgical changes
    2. Prevents fires
  - B. Lubricating increases the life of the tooling
    1. Reactive lubricants combine with the metal workpiece and make a softer material than the metal
    2. Metalworking fluids prevent buildups and welding of metals to the cutting tool
  - C. Metalworking fluids flush the metal chips which would interfere with the operations or degrade the workpiece surface
  - D. The surface finish of the workpiece is greatly enhanced by the use of a metalworking fluid
  - E. Metalworking lubricants provide rust and corrosion protection to freshly cut surfaces and also to metalworking equipment

### II. Types of Metalworking Fluids

#### A. Straight Oils: Keycut 101, KeyCut 700 & SureTap

This type of metalworking fluid is made of a petroleum derived oil base and an additive package. Straight oils are used in an undiluted fashion or in their “neat form”. The additives usually employed are sulfur, chlorine and fats. Example of this type of fluid would be KeyCut 101, KeyCut 700 and SureTap.

1. Advantages
  - a) straight oils are very useful at slow speeds
  - b) straight oils can contribute to the finest surface finishes
2. Disadvantages
  - a) straight oils do not cool as well as other types of metalworking fluids
  - b) straight oils are the most expensive types of metalworking fluids in terms of cost per gallon of coolant
  - c) straight oils with high sulfur content are not the best choice when carbide tooling or sensitive metals are involved.

#### B. Water Soluble Oils: KeyCool 2000 & KeyCut Soluble

Water-soluble oils are really straight oils that have an emulsification package added. When mixed with water, the emulsifier will disperse the oil in the form of microscopic droplets throughout the volume of water. These products are always mixed by adding the oil to the water. Metalworking emulsion concentrations are generally expressed in one of the two following ways:

Ratio – the ratio of the volume of water to be the volume of oil e.g.: ten parts water to – 10 to (1) one part oil.

Percentages – the percent that a ratio represents e.g.: 10 to (1) one = 10%

Almost all end user problems with water-soluble oils are caused by improper concentrations levels.

1. Advantages
  - a) water-soluble oils provide excellent cooling and are therefore useful in high-speed operations.
  - b) water-soluble oils are cheaper to use than neat oils
  - c) water-soluble oils do not usually cause smoke or mist, as do straight oils
2. Disadvantages
  - a) water-soluble oils can irritate the skin of machine tool operators
  - b) water-soluble oils are subject to microbiological organisms that can create odors and eventually reduce the effectiveness of the water-soluble oil

C. Synthetic Fluids: KeyCool 106

Synthetic fluids are similar to water soluble oils; the difference is that synthetic oils and additives are used rather than petroleum oils. These types of fluids are still finding their niche in metalworking but are most notable for their resistance to microbiological attack. KeyCool 106 is a synthetic fluid.

III. The Recommendations of Metalworking Fluids

When recommending metalworking fluids, the following information is most important to know:

- A. Metal involved
- B. Type of operation
- C. Type of metalworking equipment
- D. Type of tooling
- E. Speed of operation
- F. Customers present problems and future expectations

When providing technical services or advising a distributor salesperson about technical service, all of the above information is needed plus the following:

- A. A sample of the used fluid
- B. Batch numbers
- C. A description of the problem
- D. A description of the maintenance procedures done to the coolant