

# CIMCOOL<sup>®</sup>

## Technical Report

Milacron Marketing Co. | Consumable Products Division | Cincinnati, Ohio 45209

## DEFINITIONS OF ANALYSIS TERMS FOR WATER SOLUBLE METALWORKING FLUIDS

The following describe the different analyses performed on your CIMCOOL water soluble metalworking fluid mixes. To help you maximize and maintain the performance of your CIMCOOL water soluble metalworking fluid mix, these analyses are performed and the recommendations made to you. If you have any questions concerning the Analysis, feel free to contact your local Milacron Territory Manager, CIMCOOL Technical Services Engineer or CIMCOOL Technical Services in Cincinnati at 1-513-458-8199.

### Concentration

Concentration is the percentage of CIMCOOL metalworking fluid concentrate in your mix. The concentration can also be expressed as a ratio, the amount of metalworking fluid concentrate to the total volume of mix. Example: Adding four gallons of concentrate to 96 gallons of water yields a 4% or 1:25 mix concentration. To maximize your metalworking fluid, maintain the concentration within the recommended operating parameters. If the mix is too rich/strong, various problems can occur. Such problems are foam and excess residue. If the mix is too lean/weak, other problems can occur. Such problems are poor tool/grinding wheel life, rancidity, and corrosion.

### pH

pH is a measure of the acidity or alkalinity of your CIMCOOL metalworking fluid mix. It is a good indicator of the condition of your fluid mix.

Each product has a pH range within which it is designed to operate. Most metalworking fluids operate in a pH range of 8.8 - 9.2. If the mix pH is too low, various aspects of your metalworking fluid mix are affected, such as rancidity control, ferrous corrosion control, and mix stability. If the mix's pH is too high, various other aspects of your metalworking fluid mix are affected, such as mildness and nonferrous corrosion control.

### Dirt Volume

Dirt volume is the percentage of solids in your metalworking fluid mix that separates from the mix after settling or centrifuging. High Dirt Volumes usually indicate either inadequate filtration or filter problems. A high Dirt Volume can affect the performance of your metalworking fluid and lead to such problems as residue, poor finish, poor grinding wheel or tool life, and microbial growth. Dirt values should be less than 0.1%.

### Free Oil

Free oil is the percentage of oil or oil-like material which is not emulsified and floats on the surface of your CIMCOOL metalworking fluid mix. Free oil is usually the machine lubricating oils which leak into your mix. A high Free Oil percentage in your mix can lead to such problems as microbial growth, residue, and grinding wheel loading. Free oil should be 0.5% or less. NOTE: A significantly higher Free Oil than Tramp Oil value often indicates mix instability.

A high Tramp Oil percentage can promote problems, such as residue, poor grinding and machining performance, and microbial growth. Significant negative tramp oil values, such as less than -0.5%, can indicate either mix instability or contamination by a material that is picked up on the concentration determination method. Significant performance problems can be expected when tramp oil levels reach half the metalworking fluid concentration.

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## Total Oil

Total oil is the percentage of oil or oil-like material present in your metalworking fluid mix. This value includes both product oil and Extraneous ("Tramp") Oil.

## Tramp Oil

(sometimes called "Extraneous Oil")

Tramp oil is the percentage of oil or oil-like material which is not product oil. Product oil is that oil which comes from CIMCOOL metalworking fluid concentrate. The calculation of the Tramp Oil level is presented in the following equation.

$$\begin{aligned} &\text{Total Oil \% in the Mix -} \\ &[(\text{Mix Concentration \%}) \times (\text{Amount of Product Oil})] \\ &= \text{Tramp Oil \%} \end{aligned}$$

EXAMPLE: For each 1% of a CIMSTAR Sample mix, 0.46% oil and oil-like material is present according to the Acid Split Determination Method. A field sample had 3.5% Total Oil and a mix concentration determined by the MI Titration of 4.1%.

$$3.5\% \text{ TOTAL OIL} - ((4.1\%/1.0\%) * 0.46\%) =$$

$$3.5\% - 1.9\% = 1.6\% \text{ TRAMP OIL}$$

## Bacteria Count

Bacteria count is a measure of the bacteria in your CIMCOOL metalworking fluid mix. A high Bacteria Count can lead to offensive odors and failure of your metalworking fluid mix. Most metalworking fluids can tolerate a bacteria count of 10<sup>5</sup> or 100,000/mL.

## Mold Count

Mold count is a measure of the mold in your CIMCOOL metalworking fluid mix. A high Mold Count can lead to offensive odors, plugged fluid lines, and failure of your metalworking fluid mix. NOTE: Unlike Bacteria Counts which mirror the growth of bacteria in the system, Mold Counts often do not detect the mold present in or around the system. Mold is more likely to cling to surfaces and, therefore, may be well established in a system without being detectable in a small fluid sample.

## Total Alkalinity

Total alkalinity is a measure of the alkaline materials, both inorganic and organic, in the metalworking fluid mix. Significantly higher than normal Total Alkalinity can promote a more irritating mix, promote corrosion of nonferrous metals, and other problems. Alkalinity tends to increase with the age of the system.

## M-Time

M-time is an indicator of how much Additive MC-type bactericide is present in the mix. It is presented in seconds. An increase in seconds corresponds with a decrease in bactericide present in the mix. Typically, M-Times between 45 and 90 seconds indicate a good level of bactericide in the mix.

## Conductivity

Conductivity is a measure of the conductance of a metalworking fluid. It is expressed in MilliSiemens/cm. As the amount of dissolved materials, ie: calcium, magnesium, sodium, chlorides, etc., increases, the Conductivity increases. Conductivity is expected to increase slowly over time. The rate of the increase depends on the quality and amount of water used, and the amounts and types of other contaminants. High levels of Conductivity can promote various metalworking fluid problems, such as insoluble residues, mix instability, and loss of overall performance. Emulsion instability can be expected with a conductivity that reaches the 4 to 5 mS range.

## NOTES:

A "NOTE" recommendation means be aware of the value although no corrective action is warranted based upon the data.

CREAM is a light colored oil, typically opaque yellow. It is part water and part oil, is creamy in texture, and included in the amount of Free Oil. ✕