



## Concentration Control of Coolants

Concentration control or the lack thereof is a major contributor in the majority of metalworking fluid problems. Every water dilutable fluid is designed to run within a specific concentration range. If the fluid is higher than the design range it is likely that you will see more dermatitis, residue, and excess fluid usage problems. When run below the design range, corrosion, tool, and sump life problems are frequently observed. Achieving good concentration control is one of the major things that the user can do to insure the success of their coolant management program and control the costs associated with metalworking fluids.

Just what the concentration of a "used" cutting fluid is and how it should be measured is a subject of considerable discussion among analytical chemists and field service people working in the industry. The truthful answer is that there are probably at least two different concentrations used for any given working solution. One concentration is "good enough" for the day to day management of the typical fluid in the typical application. And the second where the fluid suppliers analytical laboratory goes to the used working solution and determines the amount of the individual components of the fluid that are present. This kind of "depletion analysis" is typically only done on an "exception" basis. And even then does not yield a single number but rather numbers for concentration based on how much of each of the fluid components are present (e.g. % by oil, % by yellow metal corrosion inhibitor, % by fungicide, etc.).

For the day-to-day management of fluids there are two and possibly a third method of checking concentration. The particular method selected will depend on the type of fluid in use and the situation.

The easiest and most common method is to use an optical refractometer. Refractometers are fast, reasonably accurate and work for nearly all coolants, many washing compounds, water-based rust preventatives, and maintenance cleaners, etc. Refractometers, over time, tend to read higher than "actual" concentration because the tramp oils, etc. that get into the fluid will also refract the light and affect the refractometer reading. If the system is heavily contaminated a "good" clear reading is often not possible, making the actual reading somewhat of an educated guess. On this same vane the refractometer's (like any precision instrument) meters need to be kept very clean and in calibration to get good consistent results.

