

## CONCENTRATION MONITORING USING A REFRACTOMETER

### WHAT IS A REFRACTOMETER?

A refractometer is a low-cost, portable instrument that is commonly used in condition monitoring of a metalworking fluid system. A refractometer is an optical instrument used to measure the light bending characteristics of a metalworking fluid when viewed through a prism. The light measured by the refractometer yields the fluid's refractive index which is used to calculate the fluid's concentration.

### HOW IS A REFRACTOMETER READING CONDUCTED?

A portable refractometer is an efficient means to regularly monitor the concentration of a metalworking fluid system with minimal instrument maintenance. A refractometer requires calibration with facility water prior to use. An operator collects a representative sample of a metalworking fluid system and adds 2-3 drops of fluid to the refractometer's prism. The refractometer is held to a light source to instantaneously read the fluid's refractive index. The product-dependent refractometer factor and calculation for determining a fluid's concentration by refractometer is provided in Castrol Industrial product data sheets.

### WHY IS THE USE OF A REFRACTOMETER IMPORTANT IN CONDITION MONITORING?

Routine monitoring of a metalworking fluid system's concentration by refractometer is most effective in new system charges and systems equipped with good filtration. In general, concentration by refractometer should trend with existing concentration control parameters in Castrol's used oil analysis program.

It is known that the presence of dirt, tramp oil contaminant or other contaminants introduce significant sources of error in determining a sump's concentration by refractometer. As a sump ages, it is recommended to routinely monitor the sump's condition through the Castrol Industrial used oil analysis program to verify routine concentration checks of the sump by refractometer.

A metalworking fluid sump with confirmed lean concentration may experience bacteria growth due to reduced bio resistance, formed rust on machined surfaces due to reduced corrosion protection, and other machining complications. Typically, when concentration by refractometer is consistently lower than the sump's desired concentration range, fresh product concentrate may be added to increase sump concentration.

Conversely, a metalworking fluid sump with confirmed rich concentration may experience foam generation and ultimately result in excessive product usage. Typically, when concentration by refractometer trends consistently higher than the sump's desired concentration range, water may be added to lower the sump's concentration by refractometer. Monitoring of a sump's concentration by refractometer along with routine verification of the sump's condition through the Castrol Industrial used oil analysis program helps Castrol's customers achieve full product performance of their metalworking fluid.

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