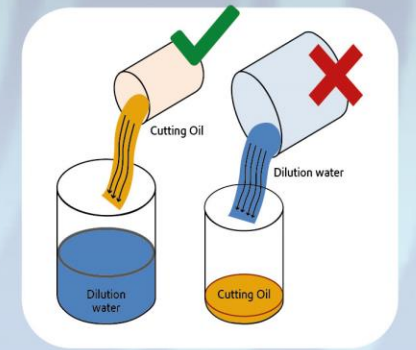
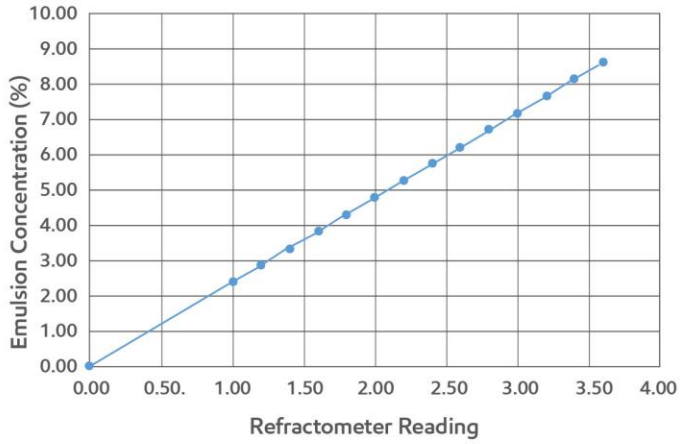
Cutting fluid maintenance and importance of refractive index of cutting oils



Best practices for emulsion maintenance

To make emulsion always mix oil concentrate into the water and not water in to the oil. This prevent invert emulsion formation and increase emulsion stability and performance. Maintain the emulsion concentration recommended for operation and metallurgy and regularly remove the tramp oil collected on the surface of the sump. For maximum productivity it is critical to consistently maintain coolant concentration at the proper level. Low concentration (<3%) will result in poor tool life and surface finish, rust on machinery and rapid biological growth. Whereas if concentration is kept too high (>10%), the coolant may foam excessively and produce skin irritations. Hence concentration should be measured and adjusted to the proper level every shift using a handheld refractometer.

Mobilcut™ 80 has a refractrive index of 2.4 and graph below shows the conversion factor of refractometer reading and actual concentration.



Refractometer reading and actual emulsion concentration

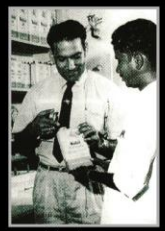
A refractometer is a hand held optical instrument that is used to measure the refractive index of a liquid. The refractive index is the degree that light is bent when passing through a liquid. The various components of metalworking fluid mixes (oil, organic and inorganic chemicals, total dissolved solids, etc.) provide a unique number on the refractometer scale, typically from 0 to 15 % (Brix scale). Refractometers read on a Brix scale rather than actual percent. To get the actual emulsion concentration in percent, one must multiply the refractometer reading by the coolant's refractive index (given on the product data sheet). For most soluble oils the index is 1, so a refractometer reading of 5 multiplied by an index of 1 = 5% concentration. However, many semi-synthetics, synthetics, grinding fluids, and some soluble oils can have a refractive index from 1.5 to 3. Hence a refractometer reading of 5 multiplied by an index of 1.75 = 8.75% concentration.

An example of an inexpensive machine shop refractometer

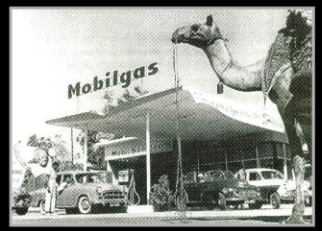
RI conversion chart for Mobilcut 80														
Refratrometer reading	1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6
Emulsion concentration	2.4	2.88	3.36	3.84	4.32	4.8	5.28	5.76	6.24	6.72	7.2	7.68	8.16	8.64
			Ideal operating concentration											

120 Years of Mobil™ in India

Mobil congratulates India on 15 August, 1947 (Advertisement in Times Of India).



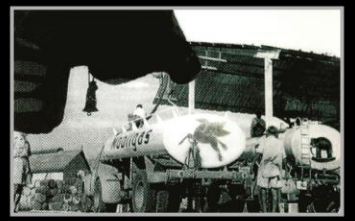
A Mobil salesperson explaining the benefits of Mobil Hydraulic Brake fluid to a customer.



1963, Mobil gas station in India.

An 1893 trade show card of the Vacuum Oil Company mentioning offices in Bombay and Calcutta.

The Mobil trademark has travelled a long time. This pictorial depiction draws the development of the trademark.



Mobilgas and Elephant brand Kerosene- two of the most popular products in India by the early 1900s.