

Metal working fluids Stability measurement with Turbiscan® at each product life stage



RAW MATERIALS

Introduction

Metal Working Fluids (MWF) are engineered fluids made to optimize metalworking operations as rolling, drawing, grinding, cutting... They are complex formulations with multiple purposes: reducing friction, mitigate heating degradation, flush away residues, protect from corrosion, achieve desired surface finish...MWF formulations can contain tens of ingredients, the major one being oil, water and emulsifiers supplemented by a large range of additive like corrosion inhibitors, lubricity additives, defoamers, biocides, anti-mist agents, dyes, extreme pressure agent, metal deactivators, wettings agents, antioxidants... As a result, optimization of MWF is elevated at the level of science and stability is a critical parameter to be probed at every stage of the product line

KEY BENEFITS

FAST
NO DILUTION
SENSITIVE

FORMULATION

USE

RECYCLING



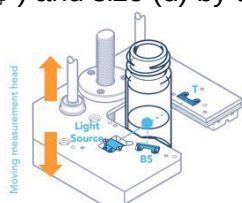
How to guaranty stability
whatever additives included ?

When do I need to change
my MWF batch ?

How do I recycle / valorize ?

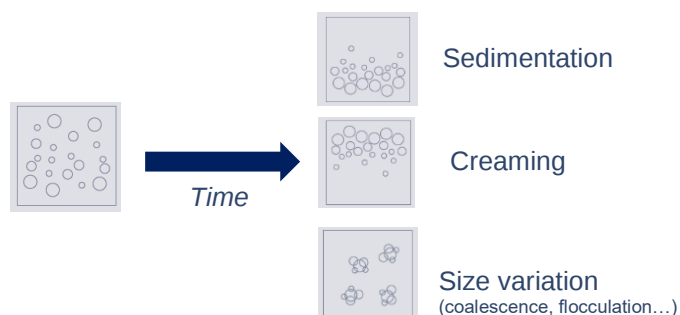
Reminder on the technique: Static Multiple Light scattering

Turbiscan® technology, based on Static Multiple Light Scattering (SMLS), consists on sending a light source (880nm) on a sample and acquiring backscattered (BS) and transmitted (T) signal over the whole sample height. By repeating this measurement over time with adapted frequency, the instrument enables to monitor physical stability, because the signal is directly linked to the particle concentration (ϕ) and size (d) by the Mie theory:



$$BS = f, \phi, d, n_p, n_f$$

Major part of MWF are emulsions whose efficiency is directly correlated to their state and stability and are, by nature, unstable colloidal systems. Destabilization can take the form of coalescence, flocculation, creaming, sedimentation... and can originate from various causes (lack of surfactant, chemical contamination etc.).



Turbiscan® and Turbiscan® Stability Index (TSI) are 'must have' tools for formulators for fast and