

QUALITY CONTROL OF SELF-EMULSIFYING OILS AND LUBRICANT EMULSIONS

The lubricant industry for machining metal parts, engines, *etc.*, offers a large range of products as emulsions, as they enable to reduce the cost of the lubricant and to increase the cooling capacities, while keeping good lubricant properties. These products are sold as emulsions or as self-emulsifying oils that are diluted directly by the user.

Application 1: Quality control of self-emulsifying oil



× **Common method:**

Visual observation is usually used to control the quality of self-emulsifying oils. This method requires waiting for around 10 hours in order to measure if the oil is homogeneous (no haziness, no phase separation), despite the addition of various additives. If haziness or phase separation occurs, it is necessary to adjust the formulation and to wait again for 10 hours to check the stability of the newly formulated oil.

A batch of oil can therefore be held back for more than 24 hours in the tank.

× **Turbiscan® method:**

The measurement of the light flux transmitted by the oil enables to detect quickly the quality of the oil produced. A scan measurement during 30 minutes allows a detection of phase separation or haziness, in an objective and traceable way compared to visual observation. The product can therefore be reformulated more rapidly if necessary. Moreover, it is possible to compare the transmission values of the produced batch to a reference. The thermoregulation enables to control the products at different temperatures to simulate the use conditions.

By using the Turbiscan LAB the quality control tests of the oils are accelerated 20-fold, enabling to increase the production capacities and to improve the reliability of the batches produced.

Application 2: Control of the stability of lubricant emulsions



× **Common method:**

If we now consider a lubricant emulsion, we can see that the dispersion state of the emulsion is an important parameter, as the homogeneity is directly linked to the efficiency of the lubricant. Here again, control tests are mainly visual assessment trying to qualify the emulsion appearance (milky, opaque, translucent, *etc.*)

× **Turbiscan® method:**

Lubricant emulsions undergo classical destabilisations: migration (creaming) or particle size variation (flocculation or coalescence). Scanning measurements enable to detect and quantify these phenomena. It is therefore possible to follow migration and particle size variation kinetics and to determine if they are acceptable or not compared to reference products. Moreover, emulsions can be characterised through the measurement of the I^* parameter, corresponding to a measure of the dispersion state of the analysed product. This gives a direct and objective measurement of the quality of the product.

Stability analyses of lubricant emulsions done with the Turbiscan LAB enable to minimize the possible errors and the subjectivity existing with visual observation and to accelerate significantly the ageing tests.

It is interesting to note also that in both cases (self-emulsifying oils and lubricant emulsions) long-term stability analyses are performed. These are similar to the previous ones (visual observation of phase separation) and are done during one month. Here again the Turbiscan LAB can be used to decrease the duration of the tests 10-fold. Tests performed with the Turbiscan LAB concern both R&D labs, that develop new formulations, and quality control departments that check the products at the end of the production line and make long-term stability tests.