

TROUBLESHOOTING THE MOST COMMON PROBLEMS IN METALWORKING FLUIDS

WHITEPAPER: JULY 2022

Job shops have unique needs when it comes to cutting fluids. These shops typically perform a variety of machining operations for different industries using a wide range of materials. Additionally, their customers often demand short production runs and fast turnarounds, and they must be able to customize and deliver high-quality end products. As a result, they face diverse operational and metallurgical challenges.

In this whitepaper, we address the most common cutting fluid problems encountered by job shops: **foam, corrosion, residues, dermal irritation and odor** – and how to overcome these challenges for optimal machining performance.

IT'S MORE THAN JUST OIL. IT'S LIQUID ENGINEERING.®





FOAM

Foam is created when air is entrained within a fluid – by either a mechanical or chemical process or, in rare cases, by both. The first step in solving foam issues is to determine which process is creating the problem. To determine if the root cause of your foam problem is mechanical or chemical, place an adequate amount of fluid from the machine tool's sump in a covered clear container and shake the sample vigorously for 10 seconds. After shaking, watch how the foam responds. If there is a significant layer of foam that does not dissipate quickly, the issue is chemical. If there is no significant foam layer, or the foam dissipates rapidly, the issue is mechanical.

MECHANICAL

If the shake test showed the issue is mechanical, the first thing to investigate is whether low fluid levels in the reservoir are causing pump cavitation. A simple inspection of the reservoir while the system is running will determine if low volume is the root cause. The second item to investigate is whether a crack or leak in a pump's housing or intake piping is allowing air entrainment in the fluid. Again, make a thorough inspection of the system and its components. Finally, inspect the system for any areas that generate excessive agitation. These include sharp corners in return flumes, significant pipe-diameter reductions, coolant waterfalls, high fluid velocities and high outlet pressures. Often, simple changes in machine design, such as inserting a metal plate to reduce a waterfall to a consistent return stream, will eliminate the foam issue.

CHEMICAL

If the shake test showed a significant layer of foam that remained, you should investigate the chemical issues creating the foam. First, investigate the source of water used to dilute your cutting fluid. A simple water-hardness test will indicate if you need to make adjustments. A hardness level less than 5 grains per gallon

is considered soft. Soft water will increase the propensity for foaming in some fluid and might require a change in water quality or changing to a different cutting fluid. If the quality of your make-up water is acceptable, look at the concentration of your cutting fluid. High concentrations (typically > 10%) can increase the potential for foaming. Reduce the concentration by adding water to the system.

The first step in solving foam issues is to determine which process is creating the problem.

If you determined that your make-up water and fluid concentration are acceptable, look for any type of chemical contamination in your fluid system, which can come from the following sources: Incompatible fluids from prior operations, excessive levels of tramp oil (hydraulic oils, way lubes, spindle oils, etc.) from the machine tool itself or other chemical compounds utilized within the shop. Often, the contaminating fluid can be managed with tankside defoamers and will dissipate over time; however, if immediate improvement is necessary, a dump and recharge is required.

Eliminating foam issues with your cutting fluids not only provides increased performance for your machine and higher throughput, it makes for a much happier operator.