Machine Shop Checklist #2B: Water-Based Metalworking Fluid Management

Water-based metalworking fluids (MWFs) eventually go bad and must be replaced because:

- Metals build up from microscopic non-filterable particles of machined iron, brass, aluminum, copper, and other metals. Even calcium and magnesium deposits from makeup water can become like destructive sandblast media, causing premature wear on tooling and parts. Unfilterable dirt builds in the solution.
- Bacterial and fungal growth degrades the MWF.
- Tramp oil buildup overpowers emulsion, displaces MWF lubricants, and feeds bacteria.
- Part drag-out loss depletes additives and active ingredients.

Know when to replace your fluid

For small sumps, it's not cost-effective to test metalworking fluid through a laboratory. Instead, track and record the condition of your MWF. Consider using the following methods to help know when it's time to replace your fluid.

Mason jar sample

- Once per month, collect a sample from the nozzle in a clear glass mason jar.
- Wait an hour to give the emulsion a chance to break down. Notice if and when it breaks down.
- Compare the sample to the unused, diluted product (under good lighting).
- Save the sample jars, compare them from month to month, and decide when to replace the MFW.

White paper sample

- Put some sump MWF on a clean piece of white paper.
- Compare this month's paper sample with last month's sample. Note the presence of dirt, metal fines, or tramp oil water on the paper. Is it time to replace the MFW?
- Can you tell what is shortening the life of the MWF? Could you treat it to prolong its life?

Remove and replace

Set up the replacement MWF for a long life by cleaning the sump and lines.

- Pump the spent fluid. Remove chips and trash. Properly dispose of the used fluid.
- Pressure wash, wipe, and soak the sump with manufacturer-recommended sump cleaner solution for at least an hour.

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- Before adding replacement fluid, double-rinse the sump and lines with fresh water that is allowed to flow for 4 hours.

Treat and extend the life of your metalworking fluid

Increase process control and improve the finish quality, output of your shop, and tool life by treating your metalworking fluid. Some shops use treatment carts to treat multiple sumps if they use the same metalworking fluid. Consider using the following methods:

Reduce metals buildup

Use full flow polyester 30 µm filters (followed by as small as 1 µm filters if practical) before returning fluid to the sump. Use magnetic filtering of iron or steel. Use deionized water (good) or reverse osmosis water (better) for makeup water. Avoid water softening.

Bacteria and fungus control

Remove chips from sumps, skim and filter tramp oil from the top of the sump, clean the sump and sump lines when you replace the MWF, eliminate sump no-flow spots, and remove sump trash. Add biocides, alkalinity, and pH additives per manufacturer's directions. Bacteria grow on chips, sump walls, and particulates. Manage the problem: Eliminate where it lives.

Tramp oil buildup

Ask the MWF manufacturer if your shop's machine lube oils and MWF are compatible. If not, consider switching to compatible lube oils. If possible, fix machine leaks. Skim and filter tramp oil.

Refractometer

Keep the MWF water reading in the desired range on the refractometer. Keep the sump at the needed depth. A low sump is a good indicator of the need for makeup water refractometer testing.

Maintenance plan

Record the last fluid dump/replacement and ongoing refractometer readings, fluid adds, alkalinity/pH/biocide adds, sump cart filtrations, and paper/jar test observations. You'll end up having to replace MWF less often and eliminate a source of production headaches.

Contact Information

Central Region: (509) 575-2490
Eastern Region: (509) 329-3400
Northwest Region: (206) 594-0000
Southwest Region: (360) 407-6300
Webpage: ecology.wa.gov/P2

Accessibility

To request an ADA accommodation, email HWTRPubs@ecy.wa.gov, call (360) 407-6700, or dial 711 for relay services. Visit ecology.wa.gov/ADA for more information.

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