



Machining

## 5 Big Problems Good Metalworking Fluids (and Maintenance) Can Help Prevent

Kip Hanson | Mar 18, 2025

About a decade ago, the International Conference on High Performance Cutting published a study arguing that using minimum quantity lubrication instead of flood coolant systems could not only save machine shops money on energy and equipment but also help reduce the costs of healthcare and waste reduction.

Citing research by the American Society of Mechanical Engineers (ASME), the *study* by engineers from Ford Motor Co. and the University of Michigan went on to say that within powertrain components at least, it's not the cost of metalworking fluid itself that imposes the biggest financial burden but the related expenses: sump cleaning equipment; routine fluid treatment including filtration, skimming, and *chemical disposal* and recycling; and last but not least, operator safety.

"The costs related to metalworking fluids are in the range of 10-17 percent of the total manufacturing cost," the report notes.

That's a lot of money, enough to negatively offset the profit margin for many shops.

But as John Treese of Master Fluid Solutions and Brent Morgan of Castrol explain, you're not going to compensate by spending less on coolant concentrate. Just the opposite.

"Time and time again, shops get in trouble by trying to save a few bucks on their cutting fluids, not realizing that it ends up costing them a lot more in maintenance, not to mention lower machining performance," says Morgan, a Castrol application engineer.

Treese, director of global training for Master Fluid Solutions, agrees. "It's the old adage: You get what you pay for."

The additives that keep pH where it's supposed to be, the corrosion inhibitors, the extreme pressure (EP) compounds—each of these and others play a crucial role in cutting fluid performance, Treese explains, and if they're not tightly controlled during the manufacturing process, or come from low-quality sources, then you'll get equally low-quality results.

Correct usage of premium cutting fluids like those produced by Castrol and Master Fluid Solutions help to prevent the following, far more costly problems:

## Shortened Tool Life

The sulfur and chlorinated paraffins used in legacy metalworking fluids to enhance machine performance, not least by prolonging tool life, have been replaced with nonhalogenated, bio-based and synthetic alternatives that are more finely tuned to the application in today's high-quality products.

Nonetheless, "it's important to maintain fluid concentrations at the manufacturer's recommended level," Treese says. "Otherwise, these safer—though still quite effective—alternatives can't do their job."

## Longer Cycle Times

Not only do high-quality cutting fluids help to extend tool life, they also buoy productivity.

That benefit can take many forms, but to a machinist, the yin to tool life's yang is cycle time, i.e., making it as short as possible without sacrificing tool life or predictability.

Each of the experts interviewed for this article can offer extensive input on what formulations will best achieve your goals based on the materials you're machining and the operations you'll perform, yet Treese offers the most succinct reason to invest in the best cutting fluid possible.

"If you're worried about the cost of your fluid, it can end up costing you a lot of money," he says.

## Increased Downtime

He'll also tell you that no one likes to *clean out coolant sumps*. But this is precisely what happens more often than it should if A) you buy cheap cutting fluid, and B) you don't take care of it properly.

That includes more than carelessness or simple neglect.

"People might joke about it, but I can't tell you how many times you'll see people spit their sunflower seeds or chewing tobacco into the machine," Treese says.

Morgan agrees, adding that far too few shops have installed tramp oil skimmers or know how to use a refractometer properly. "A lot of folks don't realize there's a factor you have to consider when calculating the true concentration," he says.

The list of what to do—and what not to do—continues, but the takeaway is simple: Spend money on the right cutting fluid and you can expect that investment to last a year, maybe two. Fail to maintain it (or any cutting fluid, for that matter), and you'll be spending weekends with a wet vac and paper towels.

## Increased Overtime Costs

Did someone say overtime? The weekend work just mentioned certainly qualifies, but the real cost comes from missed due dates, part reworking, less than efficient processes, and other symptoms of improper *cutting fluid maintenance*, quite possibly compounded by deciding to buy the wrong coolant

in the first place.

Of course, avoiding each of these depends on another investment: operator training. As Morgan noted, whether it's what factor to apply with a refractometer, which water to use (deionized or reverse osmosis is typically preferred), or how to adjust the pH and when to apply biocides or anti-foaming agents (hopefully never), even the most knowledgeable machinists often don't know any better.

Add it all up and you could easily be increasing operating expenses unnecessarily.

## **Worker Safety Issues**

Each of the less-than-best practices listed so far can lead to less-than-safe working environments. For instance, a common response when cutting tools wear too quickly or surface finishes degrade is to add more concentrate to fluid solutions.

But when operators use a 15 percent concentrate when the metalworking fluid maker has recommended 7 percent, for example, the resulting mix can be quite harsh.

"When somebody complains about dermatitis, concentration level is always the first thing I check," Morgan says.

Operators who encounter problems with dermatitis and don't consult an expert sometimes attempt to solve the problem by adding a biocide, further complicating the situation.

Other potential health issues include bacterial infections, respiratory problems and eye irritation, each of which can lead to a very expensive increase in workers' compensation insurance (not to mention the peeling paint and sticky guideways that indicate an equally unhealthy machine).

Says Morgan, "A lot of times people complain about a few bucks a gallon more, and when I explain all this to them, they're like, 'Sorry, it's just not worth it going to a premium product.'"

**What machining problems could you avoid with a high-quality metalworking fluid? Tell us in the comments below.**

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