3M

Novec™ Engineered Fluids for Metalworking and Wing Drilling

Clean, oil-free wing drilling went away...

Common wing drilling lubricants can leave behind messy, oil-covered wings and work areas when the job is done. These slippery areas can pose dangers to machinists, slow throughput and add cost. And when the wing needs to be painted, all that oily mess needs to be cleaned. By hand.

...when "vanishing oil" vanished

The only "clean" lubricant ever used by the aircraft industry in wing drilling was "vanishing oil." As its name suggests, vanishing oil provided lubrication during drilling then evaporated without a trace. Unfortunately, vanishing oil, a chlorofluorocarbon (CFC), was phased out of production due to ozone depletion concerns. And no acceptable substitute was found. Until now.

Now 3M introduces a new era in clean machining.

3M™ Novec™ Engineered Fluids for metalworking and wing drilling are an exciting new class of materials that brings back many of the performance benefits of vanishing oil without the ozone depletion concerns.

These advanced, oil-free fluids provide excellent lubrication, combined with the easy clean-up of dry machining:

Clean. Novec fluids evaporate completely, leaving residue-free chips and work areas.

Efficient. Performance actually increases at lower application volumes.

Effective. Surface roughness measures (R_a) show better performance than current lubricants.

Long-term solutions. Designed to balance performance with favorable environmental and worker safety properties, Novec fluids are accepted for use by all major regulatory agencies.

the clean alternative

Common wing drilling lubricants can leave a wet, oily mess behind. And because sealants and paint will not adhere properly to dirty wings, the wings need to be cleaned…by hand.

3M™ Novec™ Engineered Fluids, however, evaporate within thirty minutes. After that, wings can be blown clean with an air compressor. It also means that the work area, and the equipment, stay dry and clean—reducing the chance for worker accidents due to a wet and slippery workspace.

sometimes less is more

When Novec fluids were being developed, it was first thought that they should be used in the same manner that aqueous-based lubricants like Trimisol® are used: by aerating the lubricant and misting it onto the drill bit, material and machine.

When Novec fluid was applied directly to the bit without aeration, however, a remarkable correlation was observed. The smaller the volume of fluid applied (up to a point), the lower the R_a numbers of the holes.

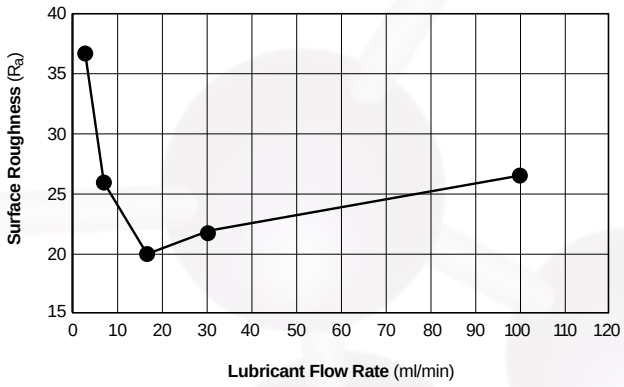
That's because Novec engineered fluids have low viscosity and low surface tension, allowing the lubricant to get into the hole and to the bottom of the drill—where it's needed most. Aqueous-based solutions, in comparison, must flood the drill bit to get enough lubricant into the hole.

To measure this phenomenon, 3M™ Novec™ Engineered Fluid MW-2410 was tested without aeration. In this test, the lowest surface roughness ocurred with only about 15ml/min.

Conditions

Work piece:	2024-T3 aluminum–1" thick
Speed/Feed:	6000 rpm at 36 in./min.
Tooling:	High speed steel two-flute twist bit
Fluid application:	Low flow rate stream (100 ml/min. to 3ml/min.)

Effect of reducing fluid flow



time is money

Switching to 3M™ Novec™ Engineered Fluids for metalworking and wing drilling can benefit your operation in many ways.

Less cleaning.
Better lubrication.
Longer-lasting drill bits.

But the most obvious is **time**. Imagine not having to roll up your sleeves, grab a rag and use “elbow grease” to clean a massive wing covered in oily metal shards. Imagine clean, dry work areas. Imagine residue-free drilling equipment.

That’s what Novec fluids bring to your operation. The ability to forget about cleaning and concentrate on machining. They can help you increase throughput and reallocate manpower.

Which ultimately means cost savings and increased profits.

A sustainable fluid technology

Based-on hydrofluoroether (HFE) technology, 3M™ Novec™ Engineered Fluids were designed to balance performance with favorable environmental and worker safety properties. So while they outperform oil- and aqueous-based systems in performance, they also excel in other important categories:

Nonflammable.
Low toxicity.
Low global warming potential.
Zero ozone depletion potential.

Additionally, these fluids are practically non-irritating to the eyes, non-irritating to the skin and are very low in both acute and chronic toxicity. Novec fluids are accepted for commercial use by regulatory agencies in the United States, Canada, Japan, Korea, Australia and Europe.

3M™ Novec™ Engineered Fluids for metalworking and wing drilling have demonstrated compatibility with a wide range of metal substrates.

Going
the extra mile...

3M style

When you choose 3M™ Novec™ Engineered Fluids for metalworking and wing drilling, you get more than a great product, you get the technical and customer support of a global partner.

Because 3M™ Novec™ Engineered Fluids are nonflammable and offer low toxicity, you can avoid the cost associated with unsafe fluid alternatives—including specially engineered facilities and equipment.

Committed to the future

While it's difficult to forecast the exact nature of legislation and regulation, it's a good bet that it will continue to evolve in favor of environmental stewardship. Novec fluids are positioned to meet ever-increasing regulatory demands.

What's more, 3M is committed to improving our technologies, with continuous new product research and development.

Contact us

If you have any questions about Novec fluids for use in metal working and wing drilling, please contact your local 3M representative or distributor, or call 3M Performance Materials Division, 800.833.5045.

For information on additional 3M fluids for the aerospace industry, visit our web site at: www.3m.com/fluids

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