

ANGUS Innovation in Action:

BIOSOLUTIONS CASE STUDY

About Biosolutions

Since its start in 1996, Biosolutions has developed and produced worker-friendly and environmentally sustainable cleaning products and metalworking fluids. Their commitment to sustainability runs deep, having received recognition from organizations such as the Michigan Green Chemistry Governor's Award and the U.S. EPA's Safer Choice program for their Clean & Green line of cleaning products.

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biosolutions
cleaning products & metal working fluids

Improving metalworking fluid performance while retaining environmental sustainability

In the world of metalworking, having a long-lasting, globally approved fluid with great lubricity helps reduce costs and improves productivity. To meet the demand for a better performing product, Biosolutions turned to ANGUS Chemical Company for help in developing an improved fluid that would also be environmentally sustainable.

The situation

Biosolutions' current coolant formulation worked well for two to three weeks, but its performance would rapidly decrease within two months. Adam Bringedahl and Joe Saviano, scientists at Biosolutions, hypothesized that microbial contamination was metabolizing important components, decreasing product performance and shortening product life.

Working together, Biosolutions and ANGUS began investigating whether CORRGUARD[®] EXT, a multifunctional primary amino alcohol, would extend the life of the fluid and improve its performance.

“CORRGUARD EXT provides a new approach to old problems in the metalworking fluid industry. Our research shows that preventing microbial contamination has become one of our highest priorities. CORRGUARD EXT helped us create new metalworking fluids that bring biostable to the table.”

Joe Saviano

Chemist, Biosolutions

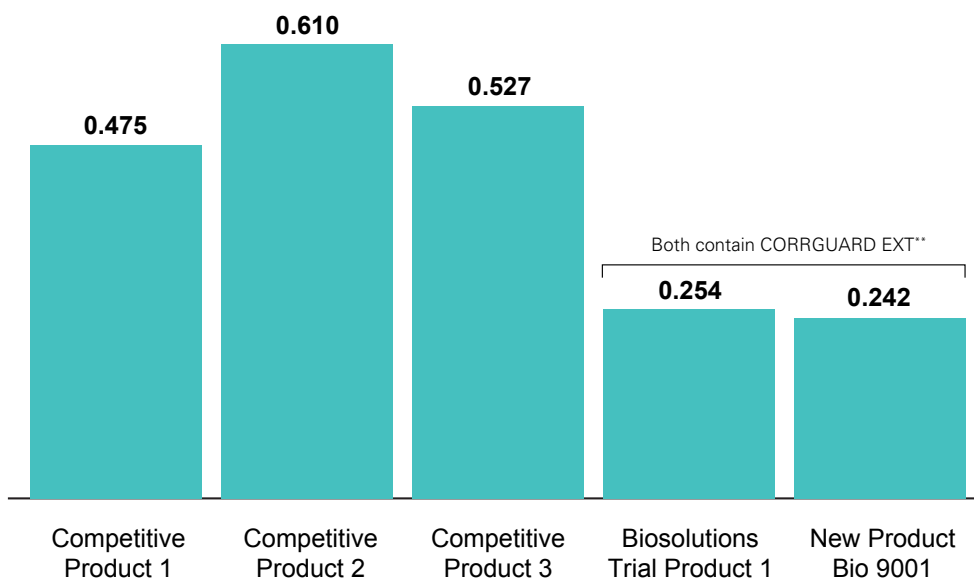
Test, and then retest

For nine months, various formulations were tested using CORRGUARD EXT and several other amines, including dicyclohexylamine (DCHA). In simulated production conditions, bacterial and fungal counts, pH and cast-iron corrosion were monitored weekly.

The results were conclusive. Two fluids containing CORRGUARD EXT—the experimental Trial Product 1 and Biosolutions’ new commercial product Bio 9001—outlasted the others by 250 percent and yielded considerably less tooling wear (see chart below).

Average Tooling Wear Over Parts Run*

Tool Size Loss in Microns



*Data from production runs on a roll form mill making automotive parts.

**Both fluids with CORRGUARD EXT resulted in less tooling wear as measured by the change in tool size (microns) before and after each test part run.

Key Findings

- The average tooling wear over the parts run for various products shows Bio 9001 outperforming the competition.
- With CORRGUARD EXT, fluid lubricity was maintained over time.
- Other fluids lost lubricity as biostability decreased.
- Test data shows other fluids initially performed slightly better, but Biosolutions’ Bio 9001 outperformed competitors by maintaining biostability for much longer.

The right formulation

Biosolutions continued the reformulation process, replacing several other components before arriving at the final product, an oil-rejecting synthetic fluid. This formulation contained CORRGUARD EXT as the main amine component, as well as a new biocide system.

The new formulation, called Bio 9001, provides many benefits to mill operators, including:

- A useful life exceeding six times that of the prior formula, generating savings in fluid, maintenance, tool replacement and labor costs (see photos below).
- Improved overall equipment efficiency (OEE) of 30 percent.
 - Increased mill capacity due to less down time replacing fluid.
 - Smoother running mills, creating less wear and fewer tool replacements.
 - More parts and higher revenue over the life of the mill.
- A cleaner mill and reduced cleaning costs due to excellent tramp oil rejection and regular removal, preventing further microbial growth and allowing fluid components, such as CORRGUARD EXT, to continue to do their jobs.

Next steps

The new fluid is successfully running on Biosolutions' customers' rolling mills, primarily used to manufacture automotive parts in the United States and China. Biosolutions is working with regulatory agencies to expand the use of the new fluid globally including Europe, Mexico and Thailand.

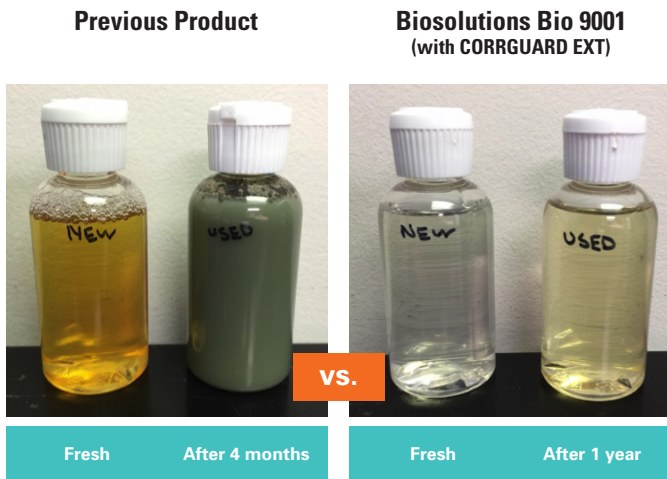
In addition, based on the success of Bio 9001, Biosolutions is testing CORRGUARD EXT in other formulations, including Biosolutions Emerald CNC, a longer-lasting fluid for computer numerical control (CNC) machining (see photos below).

"We were happy to provide applications support to Biosolutions in bringing this innovative product to market, a product that truly delights their customers, especially the mill operators who use it."

Nicole Webb

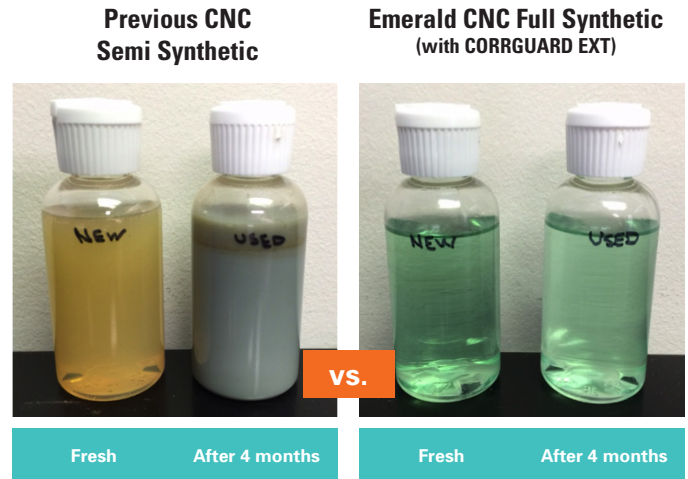
Technical Sales Representative, Metalworking Fluids
ANGUS Chemical Company

Roll Forming Metalworking Fluids



Full synthetic fluids, pulled from machine sump

Computer Numerical Control (CNC) Metalworking Fluids



Ready to use (diluted fluids), pulled from machine sump

“Over the past year, Biosolutions has undergone a paradigm shift in the chemistries we offer. Our next-generation fluids have shown a remarkable increase in long-term viability, due in no small part to the benefits brought by CORRGUARD EXT.”

Adam Bringedahl
Chemist, Biosolutions



To learn more about how ANGUS specialty additives can help your best products perform better, visit **angus.com**

CORRGUARD® EXT

ANGUS has the formulating expertise, product and technology solutions to assist you with your needs. Our breakthrough innovation, CORRGUARD EXT, enables longer-lasting metalworking fluids with improved pH stability and multi-metal compatibility.

- Significantly lengthens fluid life in the presence of registered biocides
- Maintains good pH stability without excessive alkalinity
- Excellent for multi-metal formulations (reduces need for buffering amines and phosphorus-based staining inhibitors)
- Resists extraction into tramp oil
- Excellent maintenance of ferrous metal corrosion control
- Biodegradable in the environment

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