

Case Studies:

Use It Right

Using the right metalworking fluid is proven to improve tool life and productivity.
By **Nadia Hofer**, advertising coordinator, Blaser Swisslube



Two tests were carried out at Blaser Swisslube's Technology Centre to validate the importance of metalworking fluid. When applied accordingly, it can help better chip removal, leading to shorter operating time and reduced tool wear.



▶ Test 1: Deep-Hole Drilling 18 Times Faster

The influence of metalworking fluids on the machining process is often underestimated. A project conducted with the Technical University (Technische Hochschule) in Aachen demonstrated this very clearly. The aim of the project was to reduce the machining time required to drill

a deep hole in tempered steel, an operation that took three minutes, while endeavouring to retain the same standard of quality.

To optimise these demanding drilling operations, a process of rigorous testing and adjustment was applied to tool, drilling strategy,

Operation: Deep hole drilling, diameter 8 to a depth of 200 mm

Pre-machining of pilot hole of same diameter to a depth of 16 mm

Material: 42CrMo4 + QT, tensile strength 1,000 MPa

Machine type: Mazak Variaxis 500

Tool: Kennametal and Titex drilling tools


Cutting parameters: V_c 120 m/min, f 0.25 mm/per revolution



machining parameters, metalworking fluid delivery and the metalworking fluid itself.

The water-miscible metalworking fluid was pumped through the tool at high pressure (60 bar) to evacuate chips and to prevent downtime otherwise caused by chip clogging and tool breakage. The key here is to select a metalworking fluid with no tendency to foam, even at high pressures. It is important to prevent air entrapment in the emulsion, since this is counterproductive to the cooling and lubricating action. Air entrapment also obstructs the flow that enables chips to be cleared effectively.

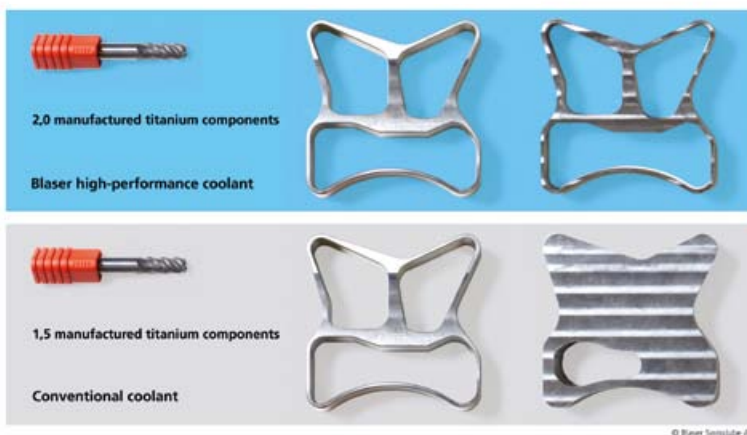
At the end of this project, the original drilling time of three minutes per hole was reduced to 10 seconds, for a depth of 200 mm — an 18-fold improvement in efficiency.

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▶ Test 2: Tool Life Increased

Pocket machining with solid carbide millers



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Another successful project at the technology centre dealt with the machining of a titanium component. Through the use of the optimum metalworking fluid, it was possible to improve the tool life by more than 30 percent in series production, compared to a conventional metalworking fluid.

The test project involved milling two identical titanium components. For this, the components were produced on the same Mazak machine, using the same tool, and with a milling program from 3D Concepts. The only difference was the kind of metalworking fluid used.

With the conventional metalworking fluid, it proved possible to manufacture one and a half titanium components before tool wear made it necessary to stop production. The solid carbide milling tool had been

Operation: milling (pocket machining)

Material: Titanium TiAl6V4


Machine type: Mazak Variaxis 500

Tool: Sandvik VHM miller

Cutting parameters: Vc 160 m/min, fz 0.15 mm, ap 25 mm, ae 0.9 mm, tea° 32 (angle of deflection)

subjected to extreme stress loading and clear signs of break down on the cutting edges were visible, alongside the normal signs of wear.

With a metalworking fluid specifically designed for the machining of titanium, it was possible to manufacture two complete workpieces without reaching the previously defined end of tool life criterion (wear of 0.2 mm) — an improvement in performance.

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The two tests have shown that when the right metalworking fluid is used, good results follow. The real issue here is choosing the right product. In order to recommend a product, the coolant manufacturer needs to know the application and what is expected of the metalworking fluid because even in a same operation, an identical product may not be well suited, due

to different geographical influences such as water quality, air humidity and temperature. In addition, other process situation such as tool quality, machine type and programming of the machine plays a part as well. In other words, every situation needs to be analysed thoroughly first.

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