

Challenges

A major manufacturer of 1040 V steel alloy brake parts was using an older technology Quaker coolant (20+ years) in most of their wet machining operations. Since they were using an older technology, the manufacturer was not operating at full potential. Furthermore, in the manufacturer's facility most of the machines, like drills, are not hooked up to a line feed causing an increase in concentrate use rather than recycled fluid, which becomes very expensive.

To help improve their operations, Quaker proposed an upgrade from the current coolant to QUAKERCOOL® 2776 a "block co-polymer" synthetic lubricant. Quaker wanted to show that by upgrading the coolant technology, there would be visible improvements in the following areas:

- Tool life
- Production
- Sump life
- Fine setting
- Tramp oil rejection
- Recycle ability
- Elimination of foam
- Good Operator acceptance with no instances of skin irritation
- Detergency (machine cleanliness, film accumulation, tool changes)
- Microbiological odors

In addition, Quaker wanted to show that by using QUAKERCOOL® 2776 the manufacturer could increase production and decrease tooling to achieve a total tool life savings amount doubling the investment cost of the new coolant.

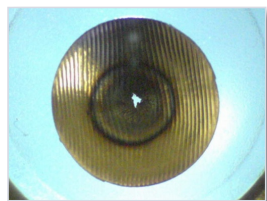
Providing Solutions

Comparing the Floor in the Hole

When the drill is removing the floor in the hole, the drill tip is at its hottest. This is a critical point for the heat control in the operation. By comparing these chips (shown below), we can see that using QUAKERCOOL® 2776 is more effective.



Using previous coolant,
Line 5 Drill #1



Using QUAKERCOOL® 2776,
Line 18 Drill #1

Analyzing the Tool Condition

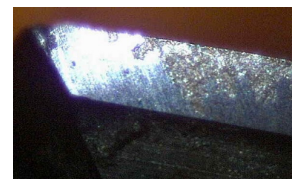
When analyzing the tool condition after a set number of parts, we can physically see improvements in tool performance when using QUAKERCOOL® 2776. These improvements include: less edge build-up, less coolant film, less carbon and tool material. There was also less tool chipping and better lubrication resulting in the tool coating staying intact. This all leads to less tool friction and heat, two of the biggest factors in extending tool life.



KTIP1550HPM at 60X, using
previous coolant, after 9,600
holes in 1040V



KTIP1550HPM at 60X, using
QUAKERCOOL® 2776 after
13,500 holes in 1040V



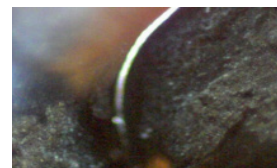
KTIP1550HPM at 60X, using
previous coolant, after 9,600
holes in 1040V



KTIP1550HPM at 60X, using
QUAKERCOOL® 2776 after 13,500
holes in 1040V

From the pictures above, it is apparent that using QUAKERCOOL® 2776 prevented both the tool edge and the tool corner from breaking apart. With QUAKERCOOL® 2776, the corner wear has a normal appearance, as though the corner melted.

The pictures below show that using QUAKERCOOL® 2776 eliminated all residues from chips melting on the tool. In addition, using QUAKERCOOL® 2776 led to a 40% increase in tool life.



KTIP1550HPM at 60X, using
previous coolant, after 9,600
holes in 1040V



KTIP1550HPM at 60X, using
QUAKERCOOL® 2776, after
13,500 holes in 1040V

Providing Solutions Cont.

Cost Benefit Analysis

By upgrading the coolant to QUAKERCOOL® 2776, the manufacturer was able to achieve a 40% increase in tool life, increasing from a baseline of 1600 to 2250 parts per drill insert. In addition, the charts below illustrate how \$2,436 in savings, based on CPU, was achieved:

Annual Coolant Cost vs. Tooling Cost		
	Previous Coolant	QUAKERCOOL® 2776
Tooling Costs	\$10,896	\$7,750
Coolant	\$4,340.15	\$2,364
Total	\$12,551	\$10,114

\$2,436 Savings based on CPU

Cost Per Unit		
	Previous Coolant	QUAKERCOOL® 2776
Tooling Costs	\$2.72	\$1.94
Coolant	\$0.41	\$0.59
CPU (cents)	\$3.41	\$2.53

\$709 Extra spending on coolant. (\$3,146) Less spent on tooling.

Benefit to Cost Ratio: For every \$1 spent on premium coolant, the manufacturer was able to save \$4.62.

$$\frac{\text{Tooling Savings } \$3,146}{\text{Extra Coolant Costs } \$709} = \$4.44$$

In 2005 the cost of using previous coolant was \$22,500. By investing \$25,000 more a year, the manufacturer will gain a tool life savings of at least \$60,000.

Product Information

QUAKERCOOL® 2776 is a heavy-duty machining and grinding fluid that provides a high degree of lubrication, cleanliness, cooling, and corrosion protection. It is suitable for use on difficult operations involving high alloy steel, carbon steel, and cast iron and for light-duty machining operations on wrought and cast aluminium alloys.

- Extremely effective “block co-polymer” synthetic lubricant features inverse solubility. Reacts to heat of metal deformation to provide instant added lubrication. Product contains no mineral oil.
- Provides excellent corrosion protection on ferrous alloys down to concentration as low as 3%.
- Excellent cleanliness leaving machines and parts free of sticky residues. Rejects tramp oil easily.
- Formaldehyde donor-free and bland odor provides worker friendly environment.
- Produces little to no foam in soft to moderate water hardness, conditions, even with high-pressure scrubber nozzles.

Process & Equipment

Line 18 Drill	
Part:	1040 V Steel Alloy Brake Part
System Size:	3,000 gallons
Part Alloy:	4115 Modified Steel
Water Hardness:	150-200 ppm
Application Pressure:	30 - 45 psi
Filtration System:	Drag out conveyor without paper filtration
Specific Operation:	Wet machining

Product & Process

Metalworking lubricants represent a very minor part of the costs in a metalworking process, typically less than 1%. This case illustrates the importance of correct fluid selection. The impact of the fluid can be a multiple of its costs making the price of a metalworking fluid insignificant. That is why Quaker focuses on developing fluids with the highest performance without compromise. Fluids that sharpen your competitive edge.