



CASE STUDY 20060202S

Heavy Duty Milling with Coolube® Reduces Tooling Costs and Setup Times

A Canadian producer of precision tooling and OEM parts used to make metal forming equipment discovered serious benefits for extensive material removal in milling by applying Coolube 2210 using a uni-Max™ Micro-Fluidization™ System.

Application: Milling of T-Slot in low carbon steel.

Cutter Size: 1" to 1.5"

Cutting Depth: 1.800"

Cutting Speed: 100 RPM

Feed Rate: 3-5 FPM

Material Thickness: 3.75" to 5"

Cycle Time: 10-15 Minutes

Cost of Cutter: \$400.00 Each

Objective: The company was not targeting any specific problems to solve, but was looking for the most efficient way to perform the particular milling operation on low carbon steel. They had tested many lubrication processes from completely dry to flood, but had never settled on an optimum process.

UNIST Solution: The company agreed to evaluate Micro-Fluidization with Coolube high efficiency lubricant for the milling operation. A single-nozzle Coolubricator™ model 9550-5-5-12 was selected to apply the lubricant directly to the cutting area.

Results: At first there were problems controlling the air and fluid mix which occurs at the nozzle tip of the Coolubricator, atomizing the fluid slightly for

optimum heat removal at the interface between the tool and the work piece. This resulted in a fog around the work area caused by the atomized mist in the air. *This is one of the most common problems for those new to Micro-Fluidization. It occurs frequently when processes are changed from flood lubrication (where operators are used to seeing / applying large amounts of fluid) to minimal quantity lubrication (where, when applied correctly, the fluid is sometimes not even seen).* Once the users understood the small amount of lubricant necessary to perform the operation and adjusted the equipment settings, there were no longer problems with mist in the air.

The milling operation itself was performed with more efficiency than any of the previously evaluated processes. The principal savings came from improved tool life to the cutter. As a result of using the Coolube, the cutters lasted twice as long between changes and sharpening. Not only did the operation require fewer tools, but the downtime was also reduced. Both of these factors contributed to a lower overall production cost. Although only the cutter data was available, there were also obvious savings that came from the housekeeping, machine maintenance and fluid handling associated with the previous flood process.

One additional note: Both standard Coolube 2210 and 2210EP, created for harder steels, were tested on this operation. In this case, both formulas yielded nearly identical results.