High-pressure throughput

END USER
NLB Corp.

CHALLENGE
Boost throughput of tough, precise waterjet parts.

SOLUTION
Coolant delivery system that provides uninterrupted flow around the cutting tool.

Gently flowing water might create a tranquil environment, but unless you're willing to wait a while, its slicing and dicing capabilities are limited. High-pressure waterjets, however, are the real deal.

Waterjet equipment from NLB Corp., Wixom, Mich., cuts metal and concrete, knocks barnacles off ship hulls, deburrs parts, demolishes roadway surfaces, scours airport runways and cleans nuclear reactor components, all without environmentally unacceptable solvents. Powered by motors that put out up to 600 hp, NLB pumps deliver water at 2,000 to 40,000 psi, through stainless steel, tungsten-carbide and even sapphire nozzles.

Understandably, waterjet systems are made up of big, tough, precise parts. Brian Jones, NLB machine shop manager, and his staff work with precipitation-hardened materials like 13-8, 15-5 and 17-4 stainless steels. "This product is very tough on the tooling," he said.

And tolerances are tight: ±0.0005" or closer, with surface finishes specified at 32 R_a or better.

In addition to meeting machining requirements, NLB puts a premium on throughput in a response to manufacturing's trend toward smaller lot sizes. "We've gone from running batches of 30 parts to batches of 10 parts, two or three runs a month," Jones said.

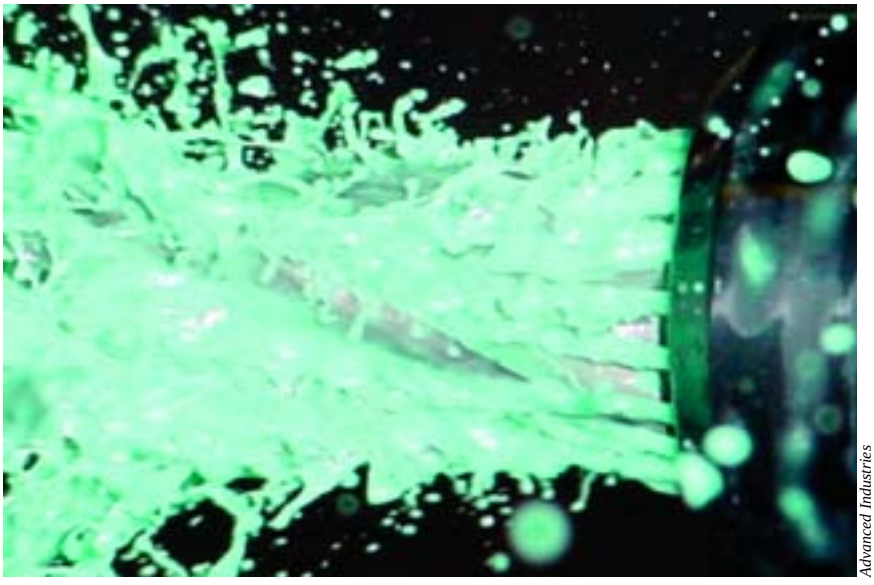
He continually searches for ways to improve machining operations. "I'm always looking in trade magazines for new or better ways of producing our product. You have to be working on the edge."

Jones sought a way to speed the production of an 8"-wide, 25"-long, 2½"- to 4"-thick stainless steel manifold. The shop was using carbide and cobalt-HSS endmills, ¼" to 1½" in diameter, to do a variety of circular-interpolated pocket milling on a horizontal mill.

Jones learned that one of NLB's preferred vendors, precision machine shop Advanced Industries Inc., Chelsea, Mich., had developed a series of toolholders, sleeves and collars that use through-spindle coolant for its own use. A series of holes around the face of the holder, sleeve or collar supplies a steady flow of coolant 360° around the tool.

With an endmill, for example, the flow entirely covers the cutting edge to reduce thermal shock and facilitate chip clearing. Advanced Industries patented elements of the system and began to market it under the KoolBlast name.

Jones put a KoolBlast coolant-fed, V-flange endmill holder to work on the manifold, and productivity improved significantly. "We were able to increase spindle speeds 200 to 300 percent and boost feed rates 150 to 200 percent," he said.



Advanced Industries

An endmill holder that provides 360º coolant contact with the cutter allowed NLB to speed up production of its high-pressure pumps.

Jones also said that improved chip evacuation enabled NLB to increase DOC. Tool life has increased by 200 to 400 percent, and surface finish is finer. "We are holding flatness requirements within 0.0005", and in some instances 0.0002", and are also holding a 16 R_a finish consistently," he said, a result of "getting that coolant down into that cutting zone." Jones points out that the improvements occurred even though the through-spindle coolant pressure on the NLB endmills is presently limited to 200 psi.

Jones said he's also applied KoolBlast holders on lathes, where they have "helped dramatically for boring our product, because now we're getting coolant down to the cutting edge as we're boring."

Jones says NLB is a leader in its industry, and its employees pride themselves on what they do. "If we give them good tooling," he said, "it just makes the job that much easier."