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### **Job shop gets abrasivejet edge on competition**

"Abrasivejet technology is widely known in the metalworking industry, but what's not so widely known is how to apply it to specific production jobs," states Scott McFarlane, President of Cutting Technology, Inc., a job shop located in Auburn, Washington.

An 11-year veteran of EDM systems, McFarlane says he based his new company on abrasivejet technology because "even though EDM can cut to much closer tolerances than abrasive jets, EDM can only handle conductive materials. Abrasivejets will cut almost anything, including non-conductive materials. That opens up a huge market for cutting things like glass, plastic, rubber, ceramics, and composites."

Before buying new equipment, McFarlane found that customers had two major complaints about abrasivejet machining: One was the long delivery times of existing abrasivejet vendors already overloaded with work; the other was the need for better accuracy.

McFarlane soon discovered these problems had been solved by the Model 2652 JetMachining Center manufactured by OMAX Corporation, Inc., also located in Auburn, Washington.

### **New Abrasivejet Technology**

The OMAX Model 2652 JetMachining Center is an integrated system consisting of a high-accuracy motion controller, an ultra-high pressure pump, an abrasivejet delivery system, and a two-axis machining table. It will cut complex flat parts up to two inches thick directly from a CAD drawing. In only minutes, the JetMachining Center can produce complex shapes to tolerances within  $\pm 0.005$  inches out of virtually any flat material.

The JetMachining Center's simple yet powerful control software runs on a standard IBM-compatible PC. The software includes a "Compute First-Move Later" motion control system, as well as an "expert system" that models the cutting behavior of the abrasivejet tool.

The JetMachining Center automates most programming and tool set-up



work, thereby eliminating the need for special skills or prior experience. "The OMAX JetMachining® Center is incredibly user friendly," says McFarlane. "It's basically plug and play."

### **Cutting at The Speed of Sound**

The JetMachining Center's abrasivejet tool uses water pumped under pressure (up to 40,000 psi) through a small sapphire orifice at 2,500 fps--about 2½ times the speed of sound! This high-speed stream of water is mixed with garnet abrasive in a carbide mixing tube, then directed at the material to be cut. The abrasivejet exerts so little cutting force that the need for fixtures is minimized. The resulting finish is free of burrs, stresses, and heat-affected zones.

To cut a part, the operator first loads a CAD drawing into the JetMachining Center's motion control system. This can be achieved either by downloading from a floppy disk or by creating a new drawing using the Center's built-in CAD program. The JetMachining Center uses this drawing to compute a tool path for cutting the part.

Next, the operator uses a computer mouse to select starting and stopping positions for the tool, and to select the cut sequence. The operator also uses the mouse to select the type and thickness of material to be cut. The Center takes all of this information and computes the precise velocity needed for the tool to travel at a speed consistent with a resolution of 2,024 points-per-inch on the tool's path.

To complete the part, the operator positions material on the machining table, selects the "MAKE" button, and the center cuts out the piece. Additional pieces are produced by simply repeating this step.

### **Through The Looking Glass**

McFarlane has landed a wide range of jobs based on the flexible, high-quality cutting capabilities of his new OMAX Model 2652 JetMachining Center. For example, he was able to help an OEM manufacturer of spin windows solve a major production problem.

These windows--9 in. diameter by 1/8 in. thick--were previously made out of tempered glass because higher quality laminated glass could not be cut using conventional methods. Yet, tempering the glass resulted in warpage and made it difficult to hold conventional glass-cutting within tolerances. As a result, half of the finished spin windows were either warped or out of dimension.

Cutting Technology was able to use the JetMachining Center to cut the

spin windows from laminated, rather than tempered, glass. This enabled the spin window manufacturer to improve quality and reduce cost.

"Quality is improved because laminated glass provides better resistance to shattering and breakage than tempered glass," says McFarlane. "The use of laminated glass also eliminates the need for performing the tempering operation, so there's no warpage. And that allows us to hold a tolerance of 0.005 inches--much closer than what is offered by conventional glass-cutting methods. The end result is a big cost savings in terms of fewer production steps and increased yield."

### **Five Easy Pieces**

Another success of Cutting Technology used the JetMachining Center to cut out skeleton- and keyhole-shaped pieces from 1x1 ft. by ½ in. thick Inconel plates.

These pieces were previously cut out using a bandsaw. And because the bandsaw could not exactly follow the profile of the pieces, a secondary milling operation was required resulting in a yield of only four pieces per plate.

But the JetMachining Center enabled Cutting Technology to cut pieces finished to final spec, resulting in a yield of five pieces per plate! The customer actually saved enough in material alone to cover the cost of JetMachining. Additional savings were achieved by eliminating secondary milling, thereby contributing directly to the customer's bottom line.

### **JetMachining: An Opportunity**

"It's a daily occurrence that we make a cold call and find an application for our JetMachining capabilities," sums up McFarlane, "and solving one person's problem opens the door to new opportunities for helping others."

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