

CNC Machines International

CNC Waterjet Machines Use Galil Controllers to Carve Designs in Carpet

There's no question that water sustains life. It also helps shape it. For instance, when water is concentrated into a high-pressure stream shot from a waterjet at 60,000 psi, it can cut and shape a wide array of materials ranging from cloth and foam to glass, plastic and rubber as fast as 100 ft. per minute. It can even cut through harder materials like wood, granite, stone, aluminum and steel.

"Fabricators have seen an explosion of waterjet, high density plasma and industrial laser cutting technologies develop in the last 25 years," said Mark Stephenson, President of CNC Machines International (CNCMI), a manufacturer of all three types of systems. "Choosing the right cutting system depends on the application requirements, such as part accuracy, process speeds and material demands."

For example, one CNCMI customer uses their VLF to precisely cut and inlay company logos into entrance matting and carpet. They also cut and inlay intricate, complex borders and designs into residential home and commercial office flooring carpet, and can carve the name of a sports team in the artificial turf that carpets the fields of sports stadiums.

Available as an ultrasonic or waterjet cutting system, CNCMI's VLF machine cuts at speeds up to 1200 inches per minute over carpet areas as large as 16 ft. x 96 ft. and with a positioning accuracy to .010 inches. Because waterjet cutting doesn't generate heat, it cuts without damaging or distorting the surrounding material (as opposed to traditional methods like a die press).

According to Stephenson, "Waterjet cutters like our VLF system need to keep the water stream tangent to the material for precise cuts. This rotary water axis must be kept tangent to the XY motion at all times. A unique feature of the machine is that it allows a bevel cut to be specified up to 45 degrees. Bevel cutting is useful in carpet cutting when you want to fit a logo cutout into the base. A straight edge cut would allow the logo to fall straight through the base material."

To ensure precise servo motor performance of the VLF, CNCMI specified the compact DMC-2153 5-axis Ethernet motion controller from Galil Motion Control. "We chose the Galil controller because it is feature rich, and provides better performance and an improved communications interface over our previously specified controllers, and was the easiest controller we've ever worked with," said Stephenson.

The DMC-2153 handles the XY axes that control the



CNCMI's VLF waterjet cutting machine

DMC-2153 handles the XY axes for linear and circular patterns, and the Z-axis to control the height.

linear and circular patterns (rack and pinion), and the Z-axis, which controls the height of the water jet. The Y-axis controls two motors for gantry function. The fifth or rotary axis controls the motion of the water jet stream by keeping it in tangent to the XY motion in order to maintain precision cutting.

As is common with computer numerical control machines, the VLF reads G-codes to enact motion. To accommodate this, CNCMI specified the Mach3 graphical user interface from ArtSoft to translate the G-codes into motion commands for the Galil controller. The software performs all calculations for precise control of up to six simultaneous axes using a trajectory planner that feeds the Galil controller a series of linear interpolation commands that are 4 msec apart.

CNCMI uses GalilTools software to easily tune the Proportional-Integral-Derivative parameters of the servo motors for optimal performance. Once tuned, the Mach3 generates the correct profile from its RS274 G and M code program. In addition to tangential motion, the Galil DMC-2153 handles constant velocity, slaving, and linear and circular interpolation.

The Mach3 software also comes with ready-made drivers for Galil controllers, resulting in significantly reduced set-up time.

Junius Hunter, CNCMI Director of Sales & Marketing, added, "Before going with the Mach3, we evaluated other CNC software packages but they fell short in meeting our high performance expectations for the VLF. The Mach3 software not only met our expectations, it worked seamlessly with the DMC-2153. For us, it's been a winning combination." ■

CNC Machines International
Raleigh, NC
www.cncmachines.us