

CNC Machine Drops Production Time for Foam Samples from Five Days to Two



A CNC machine allows Foam Fabricators to produce the typical order of 20 sample models in two days compared to the five days needed to cut the foam pieces by hand. With the exception of one person who loads the foam stock and removes finished pieces, the machine can run unattended around the clock if necessary to turn out a large order. Another benefit of automating the sample production process is that it enables the company to take on jobs it would have lost in the past. "When the shape of the customer's part was too complex to cut by hand, we had to turn away the work," says Nathan Musgrove, an applications engineer at Foam Fabricators' Jefferson, Georgia regional design and test center. "That hasn't happened since we installed the CNC machine. It can accurately cut even the most complex 3D shapes."

Foam Fabricators, headquartered in Scottsdale, Arizona, is a coast-to-coast network of 14 facilities providing shape-molded foam products, packaging, and components. Its foam products are used in the packaging of items such as electronics equipment and appliances, but they can also be found in other applications such as inside bicycle helmets. Foam Fabricators also fabricates flexible materials such

as polyethylenes, polyurethanes, polypropylenes, and EPS, both molded and extruded.

Samples for testing

Each of the company's regional design and test facilities is staffed with degreed packaging professionals



The CNC machine allows Foam Fabricators to produce the typical order of 20 sample models in two days compared to the five days needed to cut the foam pieces by hand. Shown are foam packaging materials in various stages of completion.

and fully equipped with the latest in fabricating, drop testing, computerized data acquisition, and CAD systems. When a customer comes to Foam Fabricators with a new product that needs to be packaged, the first step is to work with one of the company's engineers to determine the appropriate material. The Foam Fabricators engineer specifies the material, size, and performance characteristics for the product and uses the SolidWorks CAD system to create a 3D model of the initial concept.

Previously, samples were produced by hand. An engineering assistant used a band saw, drill press, or hot



wire to cut the foam, working from the specifications on the SolidWorks CAD drawing. This was a time-consuming process.

There was an additional drawback to producing samples by hand. Some of the shapes that customers needed were not possible to produce this way. For example, a jet ski manufacturer asked Foam Fabricators to make a bow flotation unit, a piece of foam that fits in the bow of a four-man jet ski to provide buoyancy. "This part had a lot of complex geometry and it was impossible to shape it by hand," says Musgrove. "We weren't able to make the sample, so we were unable to take on the job."

A third drawback was that the handmade models were not highly accurate since the process of cutting them required some interpolation between surfaces. This was acceptable to some customers, but others wanted greater accuracy.

One of Foam Fabricators' larger customers asked the company to consider using a CNC machine to cut the foam samples. As the company looked into this, they discovered two options: heavy and expensive machining centers primarily designed for metalworking, and inexpensive routers that could not provide the accuracy Foam Fabricators needed.

Then they found the Techno Model 160 Production CNC router from Techno ISEL, New Hyde Park, New York, which offered a perfect compromise. The machine was very accurate and robust which was designed for production routing and drilling on a wide variety of materials including wood, plastic, MDF, solid surfacing materials, and nonferrous metals. The price and the capabilities included in the Techno CNC system seemed perfect for Foam Fabricators' needs, so the company decided to purchase it. The technical specifications of the Techno machine they selected include a working area for the router of 59 inches by 50 inches and z-axis height of 12 inches, a vacuum hold-down table, 5 horsepower Columbo spindle and a raised gantry for large part clearance. The table features a rapid travel speed of 800 inches per minute, a z-axis cutting force of 200 pounds maximum, 0.0005-inch resolution and repeatability, and 0.003 inches/foot absolute accuracy.

Automated sample production

Now when a customer comes to Foam Fabricators with a request for a new product, the engineer creates the SolidWorks model, as he did in the past. But instead of creating a drawing, he exports the solid model directly into the Techno system's CAM program. Originally designed for metalworking, this CAM program is also well-suited for foam because of its ability to generate the most complex contours with little programming effort. In the CAM program, the engineer gives the command and the software creates the toolpaths for cutting the sample. The only additional input required is information such as feed rates and cutting speeds. Total programming time, from when the SolidWorks model is imported into the CAM program until



Shown are computer components readied for shipping with foam packaging produced by Foam Fabricators.

the system is ready to cut foam, ranges from 30 minutes to two hours depending on the complexity of the part.

After a piece of foam stock is fastened to the Techno machine, the operator hits the "start" button and the sample is then carved automatically. The machine does not require any supervision, except to remove the finished piece and attach a new foam block to **repeat the process.** **With this machine, a typical order for 20 samples is completed in two days. Large sample orders no longer require the production assistance of engineers.** The machine is simply kept supplied with stock and runs until the order is finished.

Foam Fabricators has been very pleased with the reliability of the Techno machine. With just regular lubrication, it functions perfectly. Part of its reliability is due to the materials used in its construction. For example, the machine uses antibacklash ball screws. **These screws have excellent power transmission due to the rolling-ball contact between the nut and screws,**

and this type of contact ensures low friction, low wear, and long life. The ball screws also make it possible to produce parts to the machine resolution of 0.0005 inch. In addition, the machine is constructed on steel stress-relieved bases with hardened steel linear ways, and ball screws with servomotors standard, which offer the best precision performance, speed capacity, and machine longevity. This shaft-and-bearing system produces very smooth, play-free motion and is an extremely rigid system that produces high-quality cuts.

Customers appreciate the faster turnaround on samples. Those who need a high degree of accuracy in their samples are noticing an improvement from the Techno machine here, too. More importantly, customers who come to Foam Fabricators seeking packaging components now have confidence that the company can take on their jobs, no matter how complex the shape of their parts. Because the CNC machine imports CAD geometry and replicates that shape exactly, regardless of the complexity, Foam Fabricators is no longer limited to simpler shapes.

Having the Techno CNC machine has paid off for Foam Fabricators in a number of ways: faster turnaround on samples, more accurate samples, better satisfied customers, and the ability to take on more complex jobs. In addition, having a CNC machine helps the company compete against other injection foam molders. "Making samples on a CNC machine is becoming the norm in our industry," explains Musgrove. "With the Techno machine, we found a cost-effective way to meet this requirement."