

## CNC Router Expands Sign Shop and Pays for Itself within One Year

By Jeff Wolf

A computer numeric controlled (CNC) router has allowed our company, National Sign and Design Group, to expand into furniture, counter tops, trade show displays, and other new sources of revenue, paying for itself within twelve months of operation. For example, we more than doubled our income when a restaurant that needed a sign also hired us to produce its counter tops and sneeze guard. We now bid on higher-margin jobs that require close tolerances, using the CNC router to achieve levels of accuracy and repeatability that are impossible by hand.

National Sign started out as a home-based screen printing business. We eventually expanded into vinyl graphics, a process in which letters that have been designed on a computer are cut from vinyl using a special plotter and then applied to a plywood substrate. When we got requests for wooden signs with dimensional cutouts, the work was contracted out to a company with a router. Over the years, however, the demand for this type of work kept growing while the quality and the dependability of the outside contractor was becoming a problem. This led us to consider buying our own router, specifically one that was computer-controlled so it could be programmed to cut computer-generated letters and other designs.



*The Techno router is easy to set up and easy to use.*

We identified accuracy, repeatability, resolution, and reliability as the most important selection criteria for the router. Some CNC routers we evaluated had components such as rack-and-pinion drives that needed frequent maintenance and other items that needed constant adjustment. We wanted to avoid these sorts of chores and concentrate on our business. Price was also a consideration. Some machines on the market at the time were priced in the \$80,000 range, and they were ruled out as too expensive for our current volume of router work.

### **Accuracy for the Right Price**

The search for a CNC router eventually led us to Techno, Inc. CNC Routers, New Hyde Park, NY. The Techno machines are designed for production routing and drilling on a

wide variety of materials including wood, plastic, MDF, solid surfacing materials, and nonferrous metals.

The accuracy level of the Techno machine was actually higher than we needed for sign making. It featured a positioning accuracy of  $\pm 1$  mm in 300 mm. We realized, however, that the ability to produce parts with tight tolerances could lead to new types of work. We also believed, after reviewing the specifications of the Techno machine that it would be as reliable as we needed. Its use of antibacklash ball screws, for example, would ensure

play-free motion. These screws have excellent power transmission due to the rolling-ball contact between the nut and screws. This type of contact ensures low friction, low wear, and long life.

We didn't find any other CNC router with the combination of capabilities and accuracy level as the Techno machine, unless they were quite a bit higher in price. The Techno system we selected cost the same as less accurate machines yet delivered the accuracy of higher-end machines.

With the purchase of the router, we moved National Sign out of the house and into a 5,000-square foot shop. Even employees with minimal computer experience were able to use the driver software and run the machine. We initially used its CNC routing capabilities to do standard

signage jobs for its existing clients and to take on contract work for other sign makers. The machine gave us the ability to produce fancier signs such as those with reliefs cut out of cedar planks. It also gave us an aesthetic advantage in the production of wooden signs with dimensional letters raised an inch or more. With most routers, it isn't possible to cut this deep with a very thin tool in one pass. An inch-thick letter, for example, would typically be cut with a 1/4-inch ball end mill. This tool would cut 1/4-inch deep on each pass, requiring four passes to complete the one-inch letter. Ideally, each pass would be cut identically to the others but with most machines, the repeatability is not high enough to permit this. This results in distinct ridges in the letter from the four different passes. The sign must be hand finished to remove the ridges. Due to the Techno machine's repeatability of 0.004 inch, we have found it unnecessary to do any hand finishing on this type of sign because this router doesn't leave any ridges.

### ***New Types of Work***

Although the sign business was expanding due to the Techno machine, it wasn't long before we were using it to do jobs that weren't related to signs at all. For example, what started out as a regular sign job turned out to include a substantial amount of carpentry. We had been hired to make a sign for a new juice store and while we were discussing the job with the owner, he happened to mention that he was having trouble getting contractors to build his counter tops and the acrylic sneeze guard above the juice preparation area. Knowing that the router could cut these materials, we offered to do that work for him as well.

The sneeze guard was designed

on the computer to match the store's display case. It was angled so that as it comes up from counter it leans away from the customer at about a 75-degree angle. At the top is a horizontal, 12-inch shelf that is used for displays. Our designer added some shelves on the kitchen side of the sneeze guard for rigidity. The whole unit needed to fit precisely onto the counter with a margin of one-quarter inch. After modeling the entire sneeze guard on the computer, the designer broke down the design into nine separate parts. He sent the files to the router, which cut all of them from a large sheet of 1/4 inch acrylic in about 20 minutes. Because the router cut so cleanly, no sanding was required. The pieces were assembled and the sneeze guard was ready in just a few hours. The counter tops were produced in a similar manner. They were designed on the computer to include holes for holding cups. The pieces were cut with the router and assembled. We also laminated the counter tops, using the router to cut the pieces of laminate as well. When the counter tops were installed in the store, they fit perfectly and the owner remarked that they looked better than other counters that had been built by carpenters. This project started out as just a sign job,



*The Techno router operates several hours a day, allowing us to bid on jobs we never could have before.*

for which we were charging \$1,000. We ended up making more than twice that amount, pulling in an additional \$1,500 for the sneeze guard and countertops.

The success of that job opened up other options for our company. Mostly by word of mouth, the area learned of our new capabilities, and we have started producing trade show exhibits with the router as well. We have also been asked to help a local manufacturer of wooden rocking horses. He was producing one horse every three weeks by hand. We use the router to cut each piece from flat stock 2 inches thick, routing out the curved surfaces of a leg, for example, across 180 degrees, then turning it over and cutting the other side. Using this technique, we can produce six horses in the time it takes to make one by hand.

With all the additional work that the router is bringing in, the machine will probably pay for itself in the first twelve months. We may eventually purchase another one. Currently, our company runs the router between four and six hours per day. But we have recently bid on jobs that never would have been considered before getting the router. A good example is the production of templates for a company that makes molds for automobile seat cushions. Each seat requires hundreds of templates that must be accurate to within thousandths of an inch. That is now within our capabilities. If we win some of the jobs we have bid on lately, the router may be used as much as 12 hours a day. We will then purchase a second machine if the volume of router work grows further.

*Jeff Wolf is the president of National Sign and Design Group in Brampton, Ontario.*