



## Making a living shooting onesies and twosies

### New trends in CNC make a home prototyping business easier than ever

In the dialect of the manufacturing belt along Lake Michigan, “shooting a onesie” is machinist slang for a single fabrication of a part from specs. Traditionally, manufacturers, designers, and inventors had to wait in line at their local machine shop for these small custom orders. Now, with the advent of home CNC machining and request-for-bid websites, prototype work is going to machinists working for themselves.

Milwaukee-based Daniel Bye had been a machinist for shops in the area since 1988. After an investment in equipment, he now earns his living through bidding jobs from home.

“I first got the idea about a year and a half ago, when I was working for a guy who was giving me so much onesie/twosie pieces,” says Bye, who now plies his CNC programming and tooling skills through his own company, Tosa Tool. “It occurred to me all I was doing all day for this guy was driving out there, writing a program, and running a part. It was a lot of short-run one-piece, two-piece-type stuff. I thought, ‘I’ve got room in my basement, I could probably do it for myself, and for better money.’”

Bye’s choice to go on his own was realistic due to the declining manufacturing base in Wisconsin, and made possible with technological advancements, making a computer-based milling set-up affordable and accurate. Wages for Wisconsin shop machinists have been falling, says Bye, due to increased competition from abroad. Although Chinese production is considered the most cost-effective way to run mass production jobs, it’s not the place people go for onesies.



*The Tormach PCNC 1100 is a midsized automated mill that has the power of bigger factory mills, without the huge price tag. The new prototyping mill allows business owner Daniel Bye to make thick cuts in any material, including titanium.*

“The interesting niche that has developed is prototypes. Prototype work is going to stay here in the States because the engineers and inventors are here in the States, and they want something they can assemble and look at before they send any production work overseas,” says Bye. “That’s the niche I’m in. My ultra-low overhead makes me unbeatable.”

### Building a basement shop

The first hurdle on Bye’s path to independent machining was the machine itself. Although manual mills could handle many jobs, the efficiency, automation, and accuracy of computer numeric controls was a requirement to make short runs in short order. “Having a CNC mill is really quite necessary if you’re going to compete these days in a manufacturing market.”

Tosa Tools operations might not have been possible even two years ago, since few pieces of CNC hardware could fit into Bye’s home accommodations. The larger-run mills that Bye worked on in machine shops were enormous — up to 20 tons

of machinery, not to mention inordinately expensive. “I couldn’t get a Bridgeport Prototrack down in my basement. There’s no way. It would’ve fallen right through my stairs,” he explains. Bigger, expensive mills had a lot of cutting speed, a feature that is superfluous when crafting a single part. “A smaller mill is not going to keep up with a brand new Fadal, Haas, or OKK CNC in terms of speed, but then you’re not spending \$70,000 on it either.”

Bye searched the Internet for smaller machines. He quickly found what was true in the CNC market at the time. Big mills were fast, oversized hulks with equally big price tags. But more affordable CNC machines were the table-top variety, intended for amateur hobbyists. They lacked the rigidity to make accurate cuts and the motor strength to work with the full spectrum of materials.



*Through answering online bids and sending clients CAD files straight into streamlined CNC milling, Tosa Tool creates one-offs of mechanical parts in a few hours.*

“I was talking to a rep from Sherline, which makes CNC table-top machinery, and I just told him, ‘These things are toys. This isn’t what I need,’” says Bye. The rep clued him into a new midsize mill just coming into the market. “He said, ‘what you want is a Tormach. I think he’s in the early stages of production, but I think Greg Jackson is building them now.’”

Greg Jackson, CEO of Tormach, was another Milwaukee-area CNC expert who ventured into his own business. He had spent three years developing a mill design that would fill the gap in the marketplace, carefully optimizing the weight, rigidity, rapid speed, and controls with the idea of affordable prototyping in mind. The result was the Tormach PCNC 1100, what Jackson calls the first “personal CNC” machine. As with the personal computer in the 1980s, the cost, size, and ease of use of CNC machining had been made practical for the individual.

was the size I dreamt of having. It had a good amount of z travel — something that I was most impressed with. It had a good-sized table, and there was a lot of cast iron involved in the machine. Anybody who knows anything about machining knows that the heavier and the more iron the machine has, the better cut you’ll be able to take and the quieter the machine is going to run.”

“I actually got to visit his home and see how the machine worked,” says Bye, who bought one of the first Tormach models released. The new machine cost only \$6,800, about half of what a large mill would have cost used. “The Tormach

Unlike the mass-production class of CNC machines that require industrial power, the personal Tormach mill plugs into a standard dryer outlet. And getting it into the basement? “I got the Tormach down there by myself, but I don’t suggest doing it alone,” Bye says.

## Bid by bid

Bye’s second hurdle in establishing Tosa Tool was finding enough onesies to make a living. Besides getting the word out to his local connections from past employers and friends, Bye scouted the Internet. Thanks to the benefits of e-commerce, Tosa Tool can take jobs from all over the world. Bye logged on as a member of a number of different quoting sites, such as [www.MFG.com](http://www.MFG.com). The site works like an eBay for fabrication services. Companies needing quick prototypes post their part plans, and machine companies bid on them. Like eBay, a rating system measures a machinist or customer’s reliability, based on the history of past orders.

The advantage for inventors and designers is fast turn around — their onesies don’t have to wait in a queue at a local shop, which might be backed up with larger, higher-priority jobs. The advantage for machinists like Bye is the opportunity to work from a home as little or as much as he needs. As the business started up, Bye did have to get used to the feast-or-famine nature of self-employment. “Sometimes I bill thousands of dollars a week. The next week I might only do one small job and spend the rest of the time selling. Sometimes I have to wait around, and other times I’ll have too much work, which feels like a burden.”

After winning a bid, Bye takes the customer’s CAD or 3D model and directs it through his CAM software to quickly produce the machine program. He uses eDrawings to view most CAD designs, and he has access from friends to solid modelers like SolidWorks, when the projects have more complicated three dimensions. For the g-code translations, he uses the software EZCAM. The automatic translation of plans to machine actions allows Bye to finish a small bid in around an hour. “I shot three parts this morning, and all of them were \$100 or more. I started at 9 o’clock, and by 1 in the

afternoon I've made about \$400 on my Tormach, so that's not too bad."

If he had purchased a smaller, less powerful mill, Bye would have been limited in the kinds of bids he could take, either in the thickness of the metal parts, the type of material, or the intricacy of detail. With the midsize Tormach, he is free to take on most metal fabrication projects. "It's not a toy. It's a real machine. I cut steel all the time, and I make pretty decent cuts. I've been able to take a half-inch rougher and make pretty hefty cuts," he explains. "I was cutting titanium on it the other day."

As a seasoned machinist, Bye has high regard for his new prototyping mill. "The control on the Tormach is very advanced. Once you learn the nuances of the control system, it will do more than 98% of CNC controls out there. The way it's fitted to the Tormach is really exceptional. For the price you really can't beat it. It has a phenomenal accuracy."

Bye demonstrates his capabilities on a recent project found on MFG.com. The \$600 job was done for Masterworks Holdings, Inc., out of Morganstown, NC. "It's cut from 2.5-in.-thick cold-rolled 1018 steel. There's a really fine slot that runs down the center that has a width tolerance of +.0005 / -.0000. I pulled it off with relative ease. The Tormach dialed right in and cut exactly what it was supposed to. I was very surprised the first time I did it."

Like many machinists, Bye focuses on the accuracy of the geometry to be cut, which is often times only a small portion of an unidentified assembly. The name, purpose, and function of what he's making often remains somewhat of a mystery. "What's this part called? A lift locator manifold something something? I don't know. You can just arbitrarily name these parts," he jokes. "It doesn't really matter as far as I'm concerned. I just make it and ship it per print, as fast as I can."



*Tosa Tool is owned and operated by Daniel Bye, who along with a degree in business administration has over 20 years in the tool & die and machining industry as a Class A tooling machinist and programmer. Customers across the country have recognized Tosa Tool's reputation as a can-do tool room and a reliable OEM manufacturer. Tosa Tool operates in Southeastern Wisconsin. For examples of past work, or for a quote, please visit [www.tosatool.com](http://www.tosatool.com).*

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