

## **Machine Builder Sees Productivity Payoff With the Mazak Integrex 300Y**

Altering a suit can be as easy as taking a few measurements and dropping it off at the tailor's. A structural I-beam is another story. Changes in an architect's plans or on a building site could mean significant penalties in time and money if customizing a structural beam or two is involved.

That is why Peddinghaus Corp. (Bradley, IL), which manufactures steel fabricating equipment, is seeing a lot of interest in its new PDL 24 machine. This portable drilling unit can be easily transported to a work site for drilling holes in beams, angle iron, plates and rectangular tubes. A precision, portable tool, the PDL 24's quick-action clamping and positioning mechanism enables the user to easily adjust and position the drill unit precisely across a beam to be drilled.

### **Expensive Parts to Machine**

To produce the two units that form the PDL 24's clamps (which are also the base support units of the machine), a cost effective process needed to be determined. "When we were prototyping the part, our first approach was to start with a casting and then farm out the machining of the casting," says Todd Bertrand, machine shop foreman at Peddinghaus. "Initially the estimated price to machine these parts was reasonable. However, after machining the prototype parts, our vendor was hesitant to take on a run of 70 parts – stating the difficulty he had in fixturing and machining the cast aluminum part. His price increased substantially."

The parts are not only long, but feature a number of deep pockets and required two setups. “We needed another approach,” said Bertrand, “and figured we could possibly machine the parts out of solid.” Machining the part out of solid bar stock of 6” X 6-1/2” in cross section, on a vertical machining center would require a \$15,000 attachment to provide a fourth axis, and the company wasn’t absolutely sure that it would provide the means necessary to make the part. Peddinghaus also needed extenders on its tools for machining the deep pockets.

### **Multitasking changes the business**

Fortunately, the company had another option, its Mazak Integrex 300Y, supplied by Mazak Corp. (Florence, KY) a short time ago. A high-performance multitasking turning and milling center with X, Z, C, B, and Y axes under CNC guidance, Peddinghaus originally invested in the 300Y to eliminate work in progress on other parts. Parts that would formerly sit on the shelf waiting to be machined because they would require a special fixture or attachment (and the resulting multiple setups) on a vertical or horizontal milling machine could now be run in a single setup.

### **Large Complex Parts**

Now Peddinghaus found itself contemplating a unique situation. The reality was the company needed to produce a large part with complex features. Its vertical machine could hog out the billets like the clamp, but would require special attachments and multiple setups to complete the part. The Integrex 300Y, bought for its capabilities and not for any particular part, was used for relatively small and simple parts, including cylinder caps. According to Bertrand, “We thought it was a fairly wild idea when our operator came up and said, ‘Why don’t we try this thing on the Integrex?’”

The advantages of multiple machining operations on a single setup quickly made themselves apparent. Workholding, for one, was easier and cheaper due to a single setup as opposed to up to four on the company's vertical, and at least two subsequently on a lathe. "Anytime you take a part that is partially machined and put it on another fixture or reset it in another machine not only adds time, but also the possibility the part may not be located accurately," notes Bertrand. Now this machine that was thought of as a CNC lathe became a machining center. Peddinghaus is now hogging out billets of aluminum on the Integrex and filling four 55-gallon drums with chips per eight-hour shift. And according to Bertrand, "Performing all the operations in a single set up from a solid piece is still more economical than machining from a casting."

### **Conversational Programming a Plus**

Ease of programming on the Integrex was another benefit. "To cut this part, we use two programs, each with 50 block functions," says Peddinghaus industrial engineer Jon Sirois, who together with operator Bill Truboch did the programming for this part. "All the programming is done in Mazatrol (Mazak's conversational programming language). I wouldn't want to have even attempted doing this in G code (required for the company's vertical milling machine). In a word, it would have been a nightmare."

According to Sirois, the number of processes required for machining this part required two programs, which run together without operator intervention. Subroutines in the first program call up tasks in the second program when they are needed. "First we have to rough the entire part out before putting any holes in," he explains. "Otherwise, if you put holes in before removing the amount of metal these parts require, there can be some distortion."

The two bores, generated with a 1.5-inch notching drill, then bored with a two-inch boring bar are the part's key dimensional features. "The rest of the machining is to

remove metal and make the part light. Weight is important since the PDL 24 is a portable machine,” Sirois says. The original aluminum billets for the part measure 6.5 x 6 x 22 inches and weigh 60 lbs. After milling is completed and the ends removed on a band saw, the finished part weighs 12 lbs. Peddinghuas is looking to making the parts from an extrusion which will minimize the amount of material removed and reduce the machining time as well.

### **Flexibility is Critical (and Cost-Effective)**

The integrated milling and turning capabilities of the Integrex in a single setup pay real time and cost dividends. According to foreman Bertrand, these parts are neither simple, nor are they high-volume. “In a lot of ways, we are like a job shop with the batch sizes we have,” he says. “We don’t keep 100 of each of our portably drilling units in stock, so we often find ourselves building them on demand. The flexibility of the Integrex is critical.” Such flexibility is cost-effective as well. The same parts cost more than 60 percent less to manufacture in-house on the Integrex 300Y. “Once it was installed, we realized all the things we could do,” says industrial engineer Sirois. “We’ve even changed our designs on some parts to move them to the Integrex. It’s an amazing piece of equipment.”