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High-tech response provides customer satisfaction

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Back when shops hammered plow blades out of iron, the way to satisfy customers was to respond to their inquiries, make parts accurately and deliver them on time. Today, part production techniques and the parts themselves are different, but the rules for satisfying customers haven't changed.

WDW Machine Inc. performs prototype and production machining for customers in the digital imaging, space communications and semiconductor equipment industries. Wilbur Webster, the company's founder, defines success simply: "We have good turnaround and really good accuracy. We have a reputation for getting jobs done when customers need them. We are honest with everybody."

Typical of WDW's work is a part it machines for Presstek Inc., a manufacturer of digital imaging technologies. Part of a base drive assembly, the 0.961"×3.228"×19.449" steel piece helps position a laser in digital printing equipment. The part has a variety of pockets and other features, more than 72 holes, squareness and parallelism requirements of ±0.0003", and tolerances as tight as ±0.0001". "If they saw the drawing, most people wouldn't even quote this job," Webster said.

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WDW makes the part from a 1"×3.350"×19.625" bar of Optiplate-XM tool steel. The ground, stress-relieved and resulfurized material is a specialty product of Burgon Tool Steel that, according to Webster, "stays as flat as a pancake" and doesn't warp during machining.

WDW machines the part on a Kitamura MY-7 or MY-3XI vertical machining center, employing a variety of proprietary fixtures developed to produce the required accuracy.

The bar first is clamped on its 3.350" dimension and roughed parallel with a Stellram 1½"-dia. inserted milling cutter at 2,100 rpm, a 25-ipm feed and a 0.100" DOC. Then the bar is finished with a Walter 2"-dia. inserted cutter run at 3,600 rpm, 35 ipm and a 0.007" DOC to achieve the required squareness and parallelism.

Next, the bar is refixtured and faced with an Iscar 4"-dia. inserted cutter at 764 rpm, 22 ipm and a 0.030" DOC. An Iscar ¾"-dia. through-coolant drill is applied at 3,200 rpm and 13 ipm to start a pocket before an Iscar ½"-dia. solid-carbide endmill roughs the pocket at 3,000 rpm, 30 ipm and a 0.300" DOC. That endmill then roughs other features and pockets. Next, a Sumitomo 9/64"-dia. through-coolant drill makes thirty-six 0.350"-deep holes at 12,500 rpm and 60 ipm.

Following 12 other drilling, tapping and milling operations, the part is turned over, refixtured and the second side is faced and roughed with the same inserted milling cutter and roughing endmill used in the first clamping. Then, a coated solid-carbide endmill is run at 5,600 rpm, 40 ipm and a 0.275" DOC to rough the part's critical alignment rail. Like the process described previously, after a 7/64"-dia. coolant-through drill makes thirty-six 0.462"-deep holes at 12,500 rpm and 60 ipm, various other drilling, tapping and milling operations are performed.

In another fixture, more holes are drilled and tapped on both sides of the part. In the next-to-last setup, the part is reclamped again and mounting pads on its bottom are milled with a Walter 2"-dia., 5-flute, coated endmill run at 1,200 rpm, 18 ipm and a 0.006" DOC to ensure the part sits absolutely flat.

Finally, a Mastercut ½", 4-flute, TiAlN-coated, solid-carbide endmill run at 2,300 rpm and 22 ipm machines the alignment rail to a parallelism of ±0.0001" over a 14" length.

WDW deburrs the part and then sends it out for 0.0002"- to 0.0003"-thick electroless nickel plating. When it returns, the part is inspected and M3 Torx screws are used to attach linear guide rails, from THK Co. Ltd., to the alignment rail. After a slide and a saddle—also machined at WDW—are attached, the part is returned to the machining center for a final milling pass with a ½", 4-flute side-cutting endmill to ensure alignment.

WDW makes parts like this in three different sizes; the smallest is described here. Depending on part size and production schedules, either the 60.2"×25.6"-travel, 15,000-rpm MY-7 or the 30.0"×17.75"-travel, 10,000-rpm MY-3XI does the machining. Machinist Adam Webster said the Kitamura machines fit the shop's needs for accuracy and repeatability. "They are rugged box-way machines with geared heads and high torque," he said, "but they are actually quiet when you run them."

WDW expects production of this component—the smallest of the three—to be in the range of 450 pieces annually. To maximize its responsiveness and throughput during the run, the shop sought ways to reduce machining time. Initially, machining consumed about 86 minutes per part. At that time, the two sets of 36 holes were being drilled with HSS drills run at about 2,800 rpm and 12 ipm, utilizing a pecking cycle to clear chips.

To speed the process, WDW switched to through-coolant drills, which permitted a fivefold feed increase to 60 ipm and eliminated time-consuming pecking. The change reduced machining time by 20 minutes. Four more minutes per part were saved by substituting a solid-carbide roughing endmill for the inserted cutter previously applied for pocket roughing. The resulting machining time of 62 minutes represented a reduction of more than 25 percent.

Responsiveness and the willingness to take on a challenge pay off. "We get a lot of work because other machine shops simply don't respond to these customers," Webster said. "We do, and we make sure we get the parts out."

For more information about WDW Machine Inc., Hampstead, N.H., visit www.wdwmachine.com or call (603) 329-9604.