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QA & Fabrication

Digging Out from Underbid - Pg. 22

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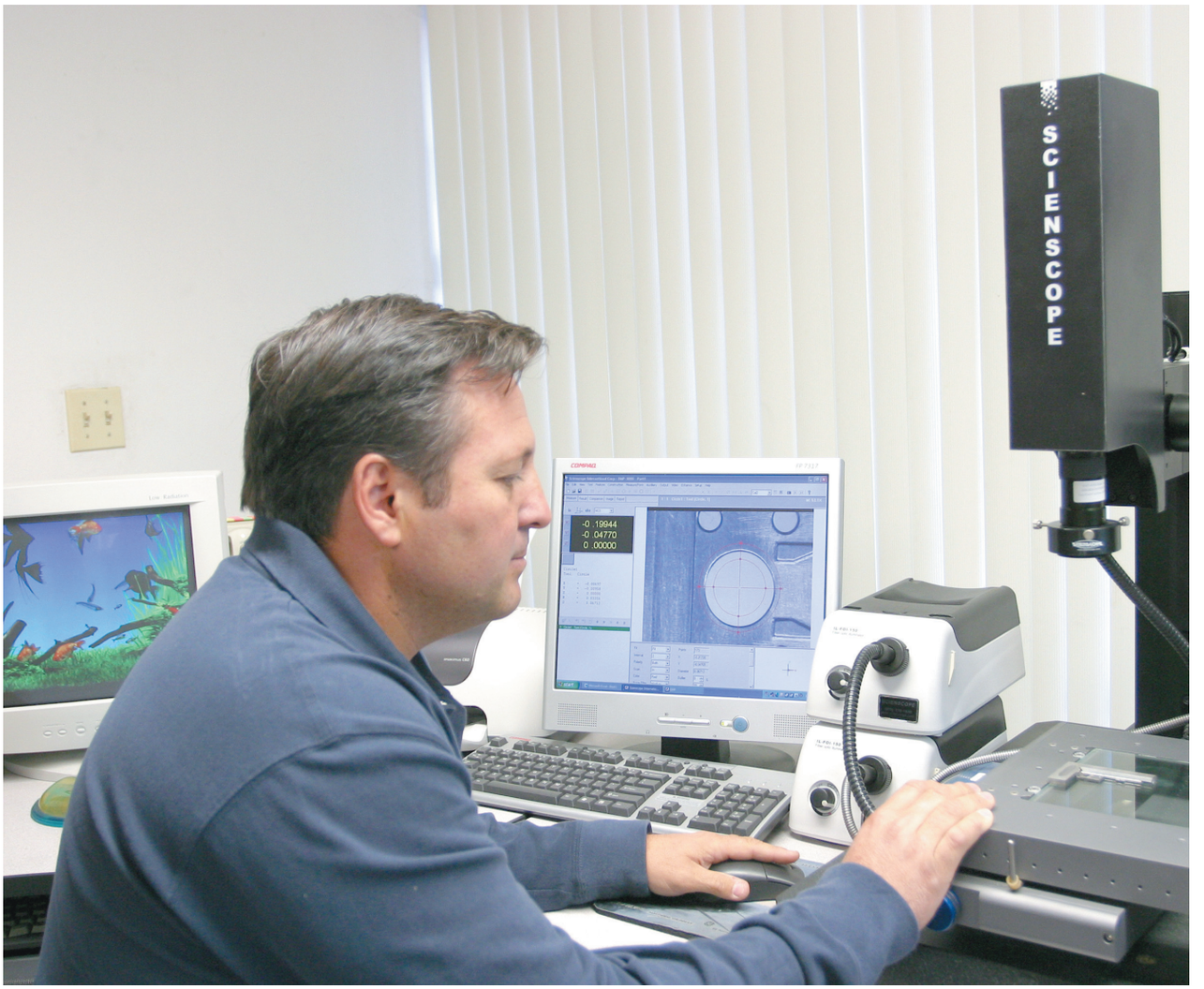


Ray Hofer at the Scienscope checking the Kovar subplate. System consists of vision system, PC, patent-pending DMP-3000 software. The system is basically a small manual video CMM.

Digging Out from Underbid

A Machining Job Shop Uses Ingenuity and Advanced Technology to Turn Around a Losing Job.

Story and photos by C. H. Bush, editor

What do you do if you underbid a major 3-year-long production contract? A little thought shows that your choices are limited.

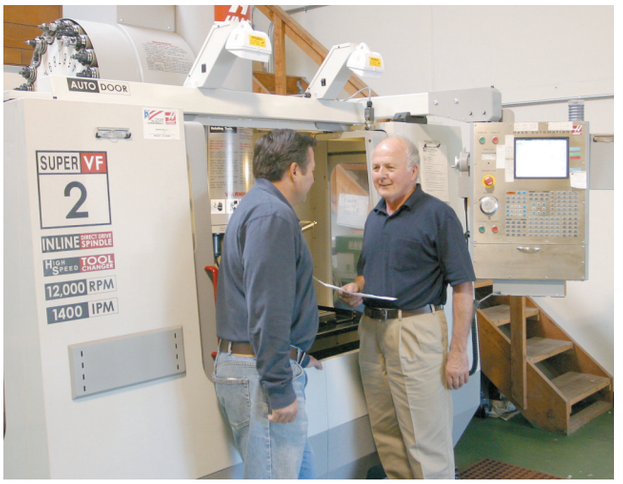
For instance, you can ask your customer for more money. You can renege on the contract and face the consequences. Or if either of those solutions don't work, you can do what Ray Hofer, vp-general manager at Torrance, CA's Milo Engineering, Inc. did: get creative and find a way to bail yourself out of the hole and make a profit.

"At Milo Engineering we specialize in making tough parts other shops don't want to do," Hofer says. "For that reason we have earned a good reputation in the industry and have built a customer base of people like Northrop Grumman, L3 EDD, Litton G & C, Hughes GM, Boeing Space & Comm., Hi - Shear and Aerojet. Which is all great, of course. On the other hand, because of our reputation, once in a while we take on projects we later wish we'd never heard of."

As a case in point, Hofer points to a contract he got from Northrup a couple of years ago.

"A buyer at Northrop sent us a package of blueprints,"

As seen in CNC-West, December 2005/January 2006 Issue



Hermann Hofer (r) president of Milo Engineering discusses production requirements with vp son, Ray Hofer. The machine is the company's latest acquisition, a Haas VF2 equipped with built-in probe.

he says. "In the package were three parts we had done for years, but there was a fourth part he put in that he said had to be part of the package. It was a three year purchase with pretty good quantities, so we wanted the job. The problem was that fourth part, made of Kovar, turned out to require precision beyond the capability of any of our machines."

Nightmare Part

The part was really small, according to Hofer, and at first glance it looked simple. *(See closeup of the part and probe on this page.)*

"It was a Kovar subplate used in a gyro system," he says. "The part required three different size holes, each with centers held to five tenths, but the way the drawing was written, the true position was such that you couldn't use the tolerance of the holes. The absolute true position of the holes in relation to each other required that we couldn't be off more than a 10th in any particular position. That's how tight this part was."

The part left Hofer in a quandary. Try to get out of doing it or buy new equipment capable of handling the tolerances required.

"We went back to Northrop," he says, "but they wouldn't budge. They wanted the part and wouldn't let us off the hook, so I went out looking for equipment."

Hofer says he looked at machines up to $200,000, but didn't find an answer, and the job couldn't justify even that amount of expenditure.

"The machines we studied had great repeatability," he says, "but they still couldn't hold the tight tolerances we needed, mainly because they didn't account for the temperature changes when you're running the part. We had to find another way to solve the problem."

Creative Solution

Hofer initially scheduled the part to be produced on a fairly new Haas VF0 machining center. He had the machine laser calibrated, but even then the machine wasn't able to handle the super tight tolerances. Nevertheless, Hofer turned to Haas, hoping the company could come up with a solution to his problem.

"We called the Haas Factory Outlet in Torrance, California," he says, "and they recommended that we retrofit the VF0 with a Renishaw probing system. That way we could probe the parts directly on the machine and get true readings."

Haas referred Hofer to Dana Cox, who runs a small company in Oxnard, CA called Automated Manufacturing.

"Dana wrote subroutines for the Renishaw inspection system which gave us all the feedback we needed to produce the part with the VF0," Hofer recalls. "The probe, an MP10, which is the smallest Renishaw makes, inspects the parts and gives us back very accurate bore readings at the end of each cycle. That way we can quickly make adjustments for tool wear. We're still getting a scrap rate of about twenty-five to thirty percent, but that's a major improvement over our original rates. I'll never buy another machine without built-in probing."

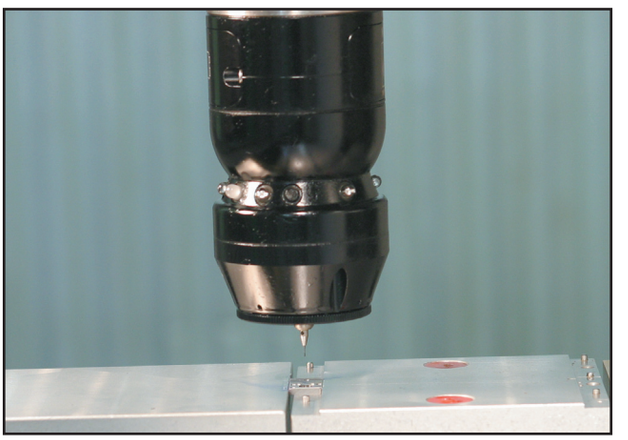
Inspection Problem

Once he found a way to produce his parts on his existing equipment, Hofer still had to find an economical way to cull that 25-30% of scrap from among the good parts.

"Northrop checks every part we send them on some very expensive equipment," he says. "If we send them an out-of-tolerance part, they know it, and that's embarrassing to us. We have a manual CMM machine we could use for inspection, but that turned out to be too slow to be practical. It took twenty minutes or more to check each part. I felt we needed a very high-precision, yet faster way to inspect these small parts."

Once again, Hofer went searching for an economical equipment answer to his inspection problem.

"The problem for us was how to quickly and economically prove to ourselves and our customer that we had produced good parts," he explains. "For us we needed to be sure we were shipping good parts, and we needed a way to



Close up of Renishaw MP-10 probe checking dimensions on the small Kovar subplate produced at Milo Engineering for Northrup Grumman.

As seen in CNC-West, December 2005/January 2006 Issue

Juan Alvarez, CNC Machinist sets up Milo Engineering's Haas VF0 milling machine retrofitted with a Renishaw MP10 probe system.

deliver a paper trail to Northrop. At the same time we didn't want to spend a lot of money on inspection equipment."

Scienscope Video CMM

Eventually Hofer leased a Scienscope manual video coordinate measurement system with that company's DMP-3000 dimensional measurement software.

"The ScienScope gave us what we need and more," he says. "First, it's programmable, so once you go through the process of checking a part, you can save the routine and reuse it. That saves a lot of time. Second, and even more important, it's a vision system that is super accurate. Once you calibrate the machine, you can quickly check your parts. In fact, we've cut down from more than twenty minutes to only a couple of minutes per part."

The Scienscope system is PC-based, Hofer says. It uses advanced digital image processing technology to capture and analyze video images for dimensional measurement. It then compares the measurement to nominal values and tolerances in order to identify nonconformance of the part being measured. The DMP-3000 software can be linked to other Windows applications such as SPC, best-fit packages and spreadsheets.

"We're hooked up live to Excel," Hofer says. "So we can collect data on the fly. We can email our results to our customers or print out a hard copy. The system is straightforward and easy to use."

Versatile System

As it turned out, Hofer was able to use the Scienscope for other things besides the Northrop subplate.

"In many ways, it's like a smart toolmaker's microscope with a video camera card attached to it," he says. "It takes a video of whatever it checks and sends the image to the computer. I can use it to take snapshots of our parts to send to customers and for other uses. We use it to check miniature threads, angles, you name it. It has an X-Y table, a work envelope of about four inches by four inches, and it zooms in Z up to 120 power. It's an amazing system."

Over all Hofer is satisfied with the way he has turned a losing job into what will prove to be a profitable one.

"We lost money the first year in 2004," he says. "In 2005 we'll break even on the job and pay for the equipment we got. Next year, the third year, we will make money. We couldn't requote the part, so I guess this is the best solution. The main thing is, by finding creative solutions, we lived up to our commitment." ■

About Milo Engineering Inc.

Founded in 1974 by Hermann Hofer, an Austrian born, Swiss-trained tool and die maker, Milo Engineering specializes in precision lathe and mill parts, drilled and threaded holes, screws, bolts and fasteners, infrared optics and laser parts and small, high-precision machined parts.

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