



New CNC machine helps differentiate one shop in competitive Los Angeles Aerospace Market

B.A.R. Engineering & Manufacturing upgrades to five-axis machining, reducing 23 set-ups to 4 on hydraulic manifold

Asher Sharoni is the president of B.A.R. Engineering & Manufacturing, Inc., a 30,000 square-foot aerospace machine shop in Cerritos, Calif., that he bought with his wife, Tova, in 2005, from the previous owners, who started the operation in 1985. "We liked the name, so we kept it," he says. Since that time, this fast-growing shop has won a Boeing Certified Preferred Supplier Award, as well as received excellent ratings on the Boeing Commercial Airline Group's ISBA, become AS9100 and ISO9001:2000 certified and is certified to produce nuclear grade products. The shop is also working to initiate a Six Sigma program with Boeing. The shop sells to numerous tier suppliers of Boeing and other aircraft builders, as well as the military sector, in their highly competitive Southern California market area.

Among its products are numerous hydraulic manifolds, profiles, structures and turned parts to 120 inches in length, made from various alloys of steel including 300M and 9000S, plus aluminum,

titanium, platinum and magnesium, Inconel and more.

Despite all these successes, Sharoni notes, "We knew we had our limitations and we needed to differentiate ourselves from the pack." The result of his investigation, along with that of his 27 design, manufacturing and operations personnel, was to step into the five-axis machine tool world. "In these economic times, we knew we were taking a risk to make that investment, but we carefully researched the available options, and decided this was the best move for our shop," he says.

The process involved seeking out the suppliers of five-axis milling machines. Sharoni found that most of them were highly priced, used for large structures, required a large footprint, and excess height beyond his shop's physical limits. He then discovered the DMU50 from DMG America, and its local technical center in Los Angeles. "Most of our milled parts are smaller and shorter runs, in the range of 10-15 inches high and 24 inches

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DMU 50 five-axis milling machine from DMG with Siemens Sinumerik 840D numerical control



By adding a rotary table, a six-axis cutting theater was achieved

long. We were doing everything on three- and four axis machines, mostly Haas and Fadal. They were good and we did quite well with them, but we knew we were missing out on many jobs," Sharoni says. In the DMU50, this shop found a smaller footprint, affordable price, less power consumption and more user-friendly control than expected, Sharoni said. "All our operators were accustomed to the basic control and they thought the CNC on this machine, a Siemens SINUMERIK 840D, would be too complicated, but they found the exact opposite was true. The control is powerful yet very user-friendly. We were able to train our operators for both our day and night shifts in a short time, which really surprised us, since our operators had never run a Siemens control before."

He described one job in particular, a hydraulic manifold previously made on a four-axis machine. The initial question was whether to make the part as a casting or a forging, but the quantities were too low and made both of those routes cost-prohibitive. The block of aluminum needed to be machined in a very complex set of convolutions, each requiring a separate set-up, owing to the number of internal holes on compound angles. In fact, 23 set-ups were needed to make the part, which resulted in a slow cycle and considerable scrap. Since each hole required a special set-up, there were 11 set-ups just for the internal holes. Furthermore, foundation plates and custom blocks were needed to run this part, so the cycle was further slowed. It was a very precarious, tedious, and time-consuming job, Sharoni recalls.

On the DMU50, the job could be hogged out on the outside, with all port holes hydraulics and even the inner holes machined without the need of separate set-ups. In the end, the part was made in just 4 set-ups, reducing the machining time by two-thirds and the scrap significantly. "We went from walking to running overnight," Sharoni said. In comparison to the time that was necessary to complete machining of this part using a 4-axis machine, the DMU50 dramatically reduced the machining time by more than 60%!

On another job, an order of 30 pieces had been run, only 18 were delivered and the others were being scrapped. When Sharoni informed the customer of the acquisition of the DMU50 and its inherent capabilities, owing to its rigid tolerances, the customer increased the order by an additional 20 pieces. The run time dropped from 20 hours to 4 hours, in that instance. "We went from a typewriter to a PC on this job," says Sharoni. He said the DMU50 produces his parts 95 percent finished, in most cases, requiring only a small lathe and milling operations on the clamped side and inaccessible areas due to limitations of the rotating carrier of the table. In another occasion, a customer had a sand casting part that was very difficult to machine because of the variations in the castings. BAR has proposed to completely machine the part as an alternative to continue with the troublesome casting, or reinvest in a new casting process. The difficult part was machined in two days to the amazement of the customer that now seriously considers a complete hogout.



Hydraulic manifold for aerospace engine



Five-axis machining reduced the number of setups from 23 to 4 to produce this part

By adding a rotary table to the DMU50, a six-axis cutting theater could be achieved, resulting in even greater flexibility, more jobs and increased profit, according to Asher Sharoni. With a 16-position tool changer, many of the jobs can be accommodated, though Sharoni notes he will be looking for a larger tool changer on his next five-axis machine, already under consideration for purchase. The shop is also looking into adding a simultaneous five-axis machine, which would enable it to move into the arena of blades and impellers.

Virtually any drawing or e-file format can be accommodated and the ShopMill program onboard the Siemens CNC can simulate the actual cutting path in a track-able sequences to determine the cycle time, prevent tool collisions and allow faster, more accurate

quoting, while reducing scrap and time-to-first-part, Sharoni says. "The machine control actually modifies the part program, when needed, and that is a real asset to us, as we learn more about five-axis work on each shift."

In addition to the machine tool and CNC technology, Asher Sharoni cited the superior service and support he received from Udo Herbes and his team at the local DMG tech center, as well as from Daniel Martinez, the Siemens CNC end user support manager for the West Coast, as key influencers in his decision to buy and likely buy again, from these companies. BAR is considering purchasing more DMU50/70 machines as it positions itself as experts in machining more difficult parts utilizing 5-6 axis machines as standard operations.

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