

# BRING ON THE CHALLENGE

## PROFILE

Baker Manufacturing Inc.

### BAKER MANUFACTURING THRIVES BY STAYING ON THE CUTTING EDGE.

Working in aerospace, some parts can be so complex they aren't definable on paper printouts; they can only be deciphered as digital computer files. "It's a challenge with an art to it, like sculpting," says Dave Baker, founder and president of Baker Manufacturing, Puyallup, Wash. And, Baker likes a challenge — the more complex, the better.

"Supported by our faith, our integrity and old-fashioned hard work, we've had a thriving business for more than 30 years," he says.

He launched the business in 1969 and today, along with his four sons and eight additional employees, continues to build a reputation based on quality and do-what-you-promise customer service.

#### *Knowing what Baker does best*

To smooth out the bumps in the cyclical aerospace industry, Baker Mfg. opts to remain a second-tier supplier, specializing in complex aircraft machining. Their diversification strategy also allows the shop to perform high-end commercial work.

"Our niche is 4- and 5-axis work in aluminum, titanium, plastics and stainless steel; we generally stay away from high-heat treat or hard metals to simplify our tooling and techniques," Dave explains. "Almost 90% of the

work is machining aluminum hogouts. We process in excess of a quarter-million pounds of it every year."

Although typical runs are 150 to 300 pieces, Baker Mfg. has done up to 72,000 parts in 18 months for one customer.

The Baker family divides up the workload to conquer machining challenges. From left are son David, who supervises all handwork and operates the CNCs; Tony, vice president and programmer; Jason, night lead; father Dave, president, toolmaker and estimator; and Brian, quality assurance manager.



About 90% of Baker Manufacturing's output is aluminum hogouts from solid billets.

Location:  
Puyallup, Wash.  
[www.bakermfginc.com](http://www.bakermfginc.com)

Established:  
1969

Business niche:  
Being on the cutting edge of technology for the aerospace industry

Employees:  
13

Okuma distributor:  
CNC Machine Sales, LLC  
Kent, Wash.  
[www.cncmachinesales.com](http://www.cncmachinesales.com)

Combined Baker innovation devised a way to use a 12.5-in.-diameter wheel cutter to machine this complex aluminum aerospace part.



The shop's emphasis is repeat work for long time periods, however. "We solicit long-term contracts," he notes. "Five- to 10-year agreements are common for us." Starting with aluminum billets, parts end up being as small as spacers (150 of which fit in a matchbox) to 50 in. long. About half the jobs fall in the 30-in. range, while the rest are around 6" x 8" x 12".

"Although we always look to diversify in electronics, mold making, medical, sporting goods and the like, we enjoy aerospace work. It's never dull!" Dave adds.

### Staying on the cutting edge

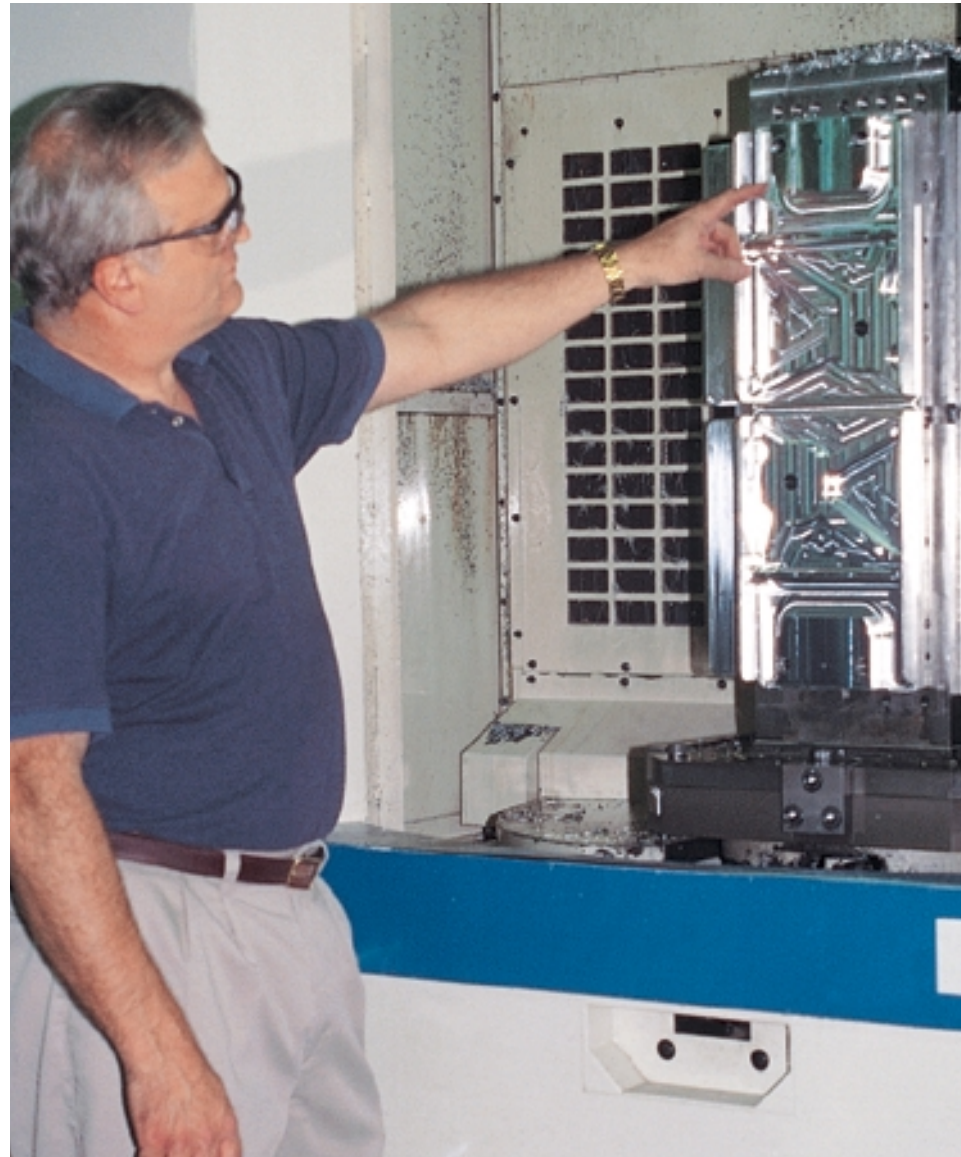
The aerospace industry also demands suppliers stay on the leading edge in programming, tooling, speeds and feeds, according to the Bakers. Son Tony, vice president, says, "You have to be willing to try new things. When someone tells us we can't do something, we think the part or

Tombstone fixtures and auxiliary 4th axes help increase productivity. Here Harry Johnson points to an eight-piece fixture for the shop's Okuma MX-50H horizontal machining center.

process is just getting interesting."

The wise use of automation helps the shop stay on the cutting edge. And it's used that approach for a long time. In 1987 when Baker Mfg. purchased its first Okuma machining center, a used MC-6H horizontal, there was no room for it in the shop. They put it in a nearby Auburn building, where it ran for seven years, lights out and unattended. The machine is back in the shop today.

The shop's four Cadet V4020 and new MA-550VB Okuma vertical machining centers all have a 4th axis incorporated. This capability, along with other typical aerospace options (toolsetters, super Hi<sup>2</sup>-NC contouring and DNC-B for direct and drip



feeding programs), keeps Baker flexible in its approaches to complicated parts.

"We often put 24 to 32 parts on one tombstone fixture. With work offsets and subroutines, we've had up to 8 megabyte programs," Tony points out, "so we need the large memory capacity and the DNC-B on our Okuma machine tools."

The machining centers are set up so that when a new pallet enters, the program is pulled with it. "This allows them to run unattended at night," he explains.

Harry Johnson, planner/estimator, came to Baker Mfg. recently after many years in larger firms. The shop's creative culture has really impressed him. "These folks use every capability in the machines



Son Jason Baker, the night shift lead, sets up the shop's newest Okuma machining center, an MA-550VB vertical with high-speed spindle.

### Smaller but powerful

Baker Manufacturing's newest Okuma vertical machining center is the MA-550VB. Its 12,000-rpm spindle, automatic tool changer (32-tool capacity), CAT 50 V-flange head, rapid feeds (1,575 ipm), Y-axis column design, and frontal 10.5-ft. width gives the aerospace shop versatility and speed in a 30% smaller footprint.

"We're shoe-horned into a 4,000-sq.-ft. facility, so its compact size is important," Tony Baker says. "With its super Hi<sup>2</sup>-NC, DNC-B-NT and NURBS contour capabilities, combined with its speed, this machine tool has changed our bid process."

For example, he cites one program that runs an hour faster on the MA-550VB than it does on one of the shop's older machine tools.

The MA-550VB achieves a maximum thrust of 3,308 ft.-lbs. in the Z-axis, which is great for drilling, boring and plunge-milling operations. Another unique feature is the vertical's combination slideways in X, Y and Z axis. The design offers the high traverse, feed and accuracy of linear ways with the rigidity and power absorption of box-way systems. The entire guideway system and ball screws are lubricated by an automatic "smart lube" system, sensitive to machine operation. And the base casting's recirculating coolant helps to control machine temperature.

As for controls, the Okuma MA-550VB employs the OSP-U100M, custom-designed to optimize the machining center's performance and accuracy. Its features include:

- self-diagnostics of the machine, CNC system and servo drives;
- a hand-held pendant with pulse handle to control axis movement (selectable in increments of 0.0001, 0.001 or 0.005 in. per pulse);
- dual processors for multifunction operation while the machine is running a part program;
- simple programming assisted by work coordinate shifting and rotation by G code, 100 tool length/diameter offsets, block skip, synchronized tapping, subroutines and dry run mode.

and combine it with Tony's programming skill to stay ahead of the curve in innovation. They courageously push the envelope with calculated risks — their accomplishments are remarkable to me."

He cites one complex aluminum part that other shops had difficulty making. Baker Mfg. devised a way to use a 12.5-in.-diameter wheel cutter, measure the part several times and let it rest at certain intervals to relieve stress. The result is to-spec parts every time.

### Quality rules the day

Statistical process control (SPC) is a way of life in the shop. "We're equipped with a coordinate measuring machine and SPC software to furnish real-time SPC charts any time a customer wants, or ship the charts with the parts," son Brian says. As head of quality assurance, he and Johnson are leading the shop toward

ISO 9000 certification.

Besides statistics, quality is a shopwide effort. "Every person here does anything it takes to get the job done right," Johnson points out. "It's a group effort to optimize tool life, speeds and feeds. They take the time to work through a challenge and show others what they're doing and why."

He adds, "Although everyone has a specialty, there are no invisible walls. Dave shares his expertise and expects others to share theirs. Cross-training is a basic element at Baker Mfg., where we teach everyone to become teachers."

Employees are also encouraged to improve skills and knowledge. Classes, if passed, are reimbursed by the company. "We invest in our people," Dave affirms.

The company also invests in quality machine tools. "In a competitive market, you have to have speed and reliability," Dave says. "Our Okuma machine tools

give us that. We run our Cadet V4020s hard and they hold up well. We can put any job in any of the four, which gives us scheduling flexibility. We consider them a real value for our business."

The shop also appreciates the MacMan feature on its Okuma machining centers. On the MX-50H horizontal, for example, with its auxiliary axis on the extra pallet, MacMan often reports a 93% spindle cut time. (The shop has fixtures and tools ready on a pallet, and the operator down-loads and proves new part programs while one part is running, so there's little down-time on the machine.) "We use MacMan to track cut, part load and set up times," Dave explains. "If we see any trends in the wrong direction, we get together to improve things."

Teamwork, innovation and quality are a matter of integrity at Baker Mfg. A sentence on its brochures and website sums it up: "At 32,000 ft., manufacturing excellence is the only option." MT

Dave Baker pats his 1983 Okuma MC-6H horizontal machining center that still cuts good parts every day. For seven years, it operated lights out at a remote facility.

