

Preferred Advantages

A look inside an aerospace parts supplier that specializes in military parts.

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In the aerospace industry, being on the military side of things is where the business is. While the commercial side is still down, the military sector is growing.

One company, Kemco Tool & Machine Co., has always focused on producing parts for the military sector. On a recent visit by CUTTING TOOL ENGINEERING to the St. Louis-based company, some of the staff opened up about what is needed to thrive in the military aerospace parts industry and how the company's relationship with one of its prime contractors, The Boeing Co., works. Kemco is a Boeing Preferred Supplier.

"The military aerospace segment is how Kemco grew up, so 99 percent of our business is military," said Haider Nazar, vice president of new markets at Kemco. "Of that 99 percent, the lion's share is with Boeing and most of that is split between missile programs and aircraft."

Founded in 1955, Kemco provides machining, tooling, fixturing, welding, complex assemblies and ground-support equipment, making it a one-stop shop. The minority-owned company has a 60,000-sq.-ft. facility and 60 employees—about two-thirds on the shop floor.

Part quantities range from one-off prototypes up to full production runs. Kemco machines castings, forgings and machine billets. One of its most recent

large parts was a 113" extruded tube for a missile program. Smaller parts measure down to 0.060" in diameter.

"We can run as small as a No. 80 micro-endmill," said J.C. Caldwell, vice president of operations. "We have literally cut parts held with two-sided tape because they were so small."

For inspection, Kemco has a quality lab and the software capabilities to "check inside any part we do," said Caldwell. The measuring instruments in the lab are certified and calibrated to the standards Kemco has to meet. If the part is too large to fit inside the lab, Kemco has optical and laser equipment to inspect it.

Tolerances vary from part to part—from 0.125" to as tight as 0.0002". Kemco's coordinate measuring machine has measuring lengths of 31" for the Z-axis, 60" for the Y-axis and 110" for the X-axis.

Military Requirements

Producing military parts is somewhat different than producing commercial parts. With government contracts, parts must adhere to MIL-Spec requirements. "There is no deviation whatsoever unless we submit a deviation request," said Caldwell. "When we actually see the part, though, we might come up with a better process or design. We then submit



This shell of the EPC (electrical power center) for the C-17 trainer is one example of Kemco's CNC machining, fabrication, welding and assembly capabilities.



S. Woods

Kemco's new Johnford 5-axis machine increases its capabilities and competitiveness.

that to the customer.”

Caldwell explained that some of the requirements date back to when the F-15 aircraft was first proposed, and the cutting technologies and machine tools were not where they are today. “Now, we have better machines that are faster with a lot more capabilities, which increases our efficiency,” he said.

Nazar noted that a lot of times it is not a deviation necessarily, but more that “we are helping them with a producibility study. They don’t know themselves whether the design is truly the most cost-effective. They haven’t actually produced it.”

“They might put a 0.030” fillet in something and build a 6” wall next to it with limited access,” said Dennis Phillips, Kemco’s senior programmer. “It is impossible to get a cutting tool down to the indicated surface and achieve such a small fillet radius. So we recommend to our customer a deviation to a larger radius in that area. Nine times out of 10, they are pretty accommodating.”

A shop must be set up for the move to military, if that is its direction. For instance, Phillips used to work in a die-casting shop that tried to diversify its customer base. “We weren’t set up for it,” he said. “We were set up strictly for [producing] dies. It is very expensive to go another route if you don’t want to go

full-bore into it. The company finally decided to pull back, stick with dies and ride out the economy.”

How to Differentiate

Competing with other aerospace parts suppliers is tough, especially in a weak economy. A company really needs to differentiate itself. It can do this by offering more than just machined parts, such as engineering or assembly services.

“A buyer at Boeing once told me that

if there is a complex job, especially a prototyping job, he’ll come to Kemco because we will really partner with him and help him understand what it will take to bring that part into production,” said Nazar.

Historically, those are the types of parts Kemco has collaborated on, where it does a lot of the up-front prototype work, such as on the SLAM-ER and Harpoon missile programs. Because of that, Kemco earned the right to machine the production run.

Another way a company can differentiate itself is by being accommodating. The largest part Kemco ever machined was the ASTOVL—a prototype of a fuselage frame that had to be shipped on a 52’-long flatbed trailer, which required special transportation permits.

“It was not the norm for us,” said Dan Henderson, manufacturing planner. “The shops that specialize in big parts are the primes, but Boeing could not get it done in time. So they called on us because they know our capabilities. We literally hired 16 welders, certified them, and they were dedicated to this program for 9 months.”

Kemco did not have the space for this project in its facility, so it built temporary heated quarters outside. “We have a big parking lot,” Henderson added.



Kemco

Coordinate measuring machines are used for inspecting finished parts.

Preferred Supplier Benefits

Developing a strong, lasting relationship with a prime contractor is important and can lead to becoming a preferred supplier. Becoming a preferred supplier is based on meeting quality and delivery requirements.

At a baseline minimum, Boeing suppliers have to meet quality and delivery targets every month. "Reports are given out so you know where you stand," said Nazar. "If you are delinquent, you're put on probation. You can drop down and move up on that list, and if you drop off the list, then your request-for-quote flow is adjusted accordingly."

Being a preferred supplier has its benefits. "When the new programs come out, you are actually invited to the bidder's session," said Caldwell. "This session is an overview of the program, with all the components and deadlines needed by our customer. They give you a window of how big and complex the parts are." Kemco staff can then evaluate and decide if it is something they want to take on.

Being a preferred supplier for Boeing also allows Kemco to invest in newer technologies and capabilities to try and obtain more work. For instance, the staff believes Kemco's new 5-axis machine, a Johnford DMC 2600SH, will allow it to be more competitive on some of the Boeing projects, such as theUCAV, the unmanned vehicle pro-

gram. "We can now manufacture large wing-frame parts and structural aircraft parts in full 5-axis," said Henderson.

The high standards Kemco conforms to for its Boeing projects filter down to the work it performs for other customers. Those customers see their expectations met because they're working with a company that is used to delivering high quality on time on a regular basis.

Although Boeing provides the highest percentage of purchase orders at this time, Kemco realizes diversification is essential. Having the majority of revenue come from one customer can be risky. "Because we earned the right to have these long production runs with Boeing," said Nazar, "that has allowed us predictability in our revenue. We are using that as an opportunity to invest in one or two other areas." In 2003, Kemco brought on a customer in the firearms industry and produced some tank and automotive parts. The company is also going out to arsenals and military bases and getting some work there as well.

Solid and Lean

Teaming up with Boeing has led Kemco to expand its engineering capabilities and become lean.

Kemco is in a transition period with regard to blueprints vs. solid models. "In the old days, you used to get a blueprint with no model and then build the model," said Phillips. "Now, we are getting both. Sometime in the near future, we'll probably do without the paper and just get the model. But right now, we are equipped for both."

Currently, Kemco is working on a prototype missile for Boeing. Kemco is making four similar prototypes, all done from CAD solid models in Unigraphics. The challenge, as with any prototype project, is that the design is always evolving, said Henderson. "Therefore, we have to remain flexible enough where we can react in a rapid fashion."

Kemco has found it easier to work from a solid model than a blueprint. "It is simpler for the customer and for us," said Phillips. "It used to be that I would get maybe six sheets of blueprints and



A fiberglass seat for a training simulator.

then build a 3-D model. That model, though, is my interpretation of what those six pages mean, and my interpretation could be wrong." Model-based definition from a customer is better because there is a final part definition without the need to interpret print data.

Also, if there is an engineering change, Kemco can take that new model and plug into its Unigraphics database and check it against the previous model. Because the toolpaths are already there, all Kemco has to do is generate paths for what has changed.

Kemco took the initiative on implementing lean manufacturing processes. "We knew we had to be there and, because we are a preferred supplier, Boeing helped us," said Nazar. Kemco began lean manufacturing training in early 2001. Boeing educated Kemco's executive staff on the principles of lean with its Lean Pathways initiative; it was a 15-month program.

"You learn what is value-added time and what is nonvalue-added time," said Caldwell. "The concept applies not only on the shop floor but in the way you quote a job or do your clerical work. The same principles apply throughout your organization, which allows you to be more price competitive."

Manufacturing requires planning documents that stay with all parts as they move through production in the



Missile parts for the Harpoon and SLAM-ER programs.

facility. Known as job travelers, these documents allow actual time tracking for each job. This allows management to track status reports daily, and then make problem-solving adjustments to meet delivery.

On the machining end, Kemco had to take on a different mindset to follow the lean principles. The old view was that if Kemco received a purchase order, all the parts would be run in one production lot. With lean manufacturing, though, Boeing only takes so many parts at a specific time. The customer does not want to inventory product because of costs and it takes up floor space. "With the Boeing Min Max system, we supply

a constant flow to our customers," said Caldwell. "They pull just in time what they need for that week."

Phillips said: "It also has to do with the availability of the tools that people need to use. It used to be you could borrow a tool from the guy across the shop, [which] might not be put back. Now, a lot of the tooling that they require is all localized in their area so they don't have to wander around looking for a tool. It is more efficient."

Although buying multiples of the same tool for each cell might not sound too lean, it pays off in the long run. "You might find that one guy spent 20 minutes looking for a wrench," said Phillips.

It is important to emphasize to operators that lean does not mean downsizing. "You need to get people to take ownership and have them understand that they are not losing their jobs," said Caldwell.

"The reality is, if you are not going to be lean, you aren't going to get business from some of these primes," said Nazar. "They are requiring it."

Military aerospace parts customers are looking for more than just a machine shop. It is not just about pushing a button and running a certain spindle speed anymore. Parts suppliers are being asked to participate more up front, such as performing more of the producability and engineering services.