Process Improvement

at True Position Technologies

Multipallet machining reduces lead times, labor, and costs at CA aerospace shop.

It's very easy in today's hurried business world to fall prey to tunnel vision. With reduced workforces and increased demands from customers, companies may be so busy "putting out fires" that they lose sight of the big picture: "How are we doing things? Why are we doing them this way? Are they working? Is there a way we can make things better?" Job shops that survive in today's competitive global marketplace are progressive ones that continually look for more efficient, economical ways to operate. True Position Technologies is one of those companies.

Founded in 1990, True Position Technologies (TPT) is a world-class manufacturer of precision-machined parts and subcomponent assemblies for the aircraft, aerospace, electronic, medical, and other commercial industries, but most of their work is in aerospace. They build parts for industry heavyweights including Eaton Aerospace, Parker-Hannifin, GE Aviation, and Alliant Techsystems.

An engineer at True Position Technologies sets up an operation on a Matsuura VMC.

True Position Technology's manufacturing facility has grown dramatically over the years. They started in a 8500 ft² (790 m²) building with a couple of CNC mills and lathes, and in 1997 moved to a 20,000 ft² (1860 m²) space. Today they are located in Valencia, CA, in a modern, 43,500 ft² (4046 m²) facility, and have over 100 employees. Since moving to their new facility in 2008, TPT has increased their machining capacity by 47% to 110,000 hours. TPT runs two shifts; the second shift is primarily for lights-out operations, and weekends are solely reserved for untended machining.

Using 10 different machining cells, TPT specializes in producing very complex, close-tolerance parts in volumes ranging from one to 100 pieces. The parts usually come with multipage drawings and tolerance requirements are in ten-thousandths (0.0001" or 0.00254 mm). Each cell handles a variety of work, but some cells run mostly stainless, others run aluminum, and some are used exclusively to machine titanium.

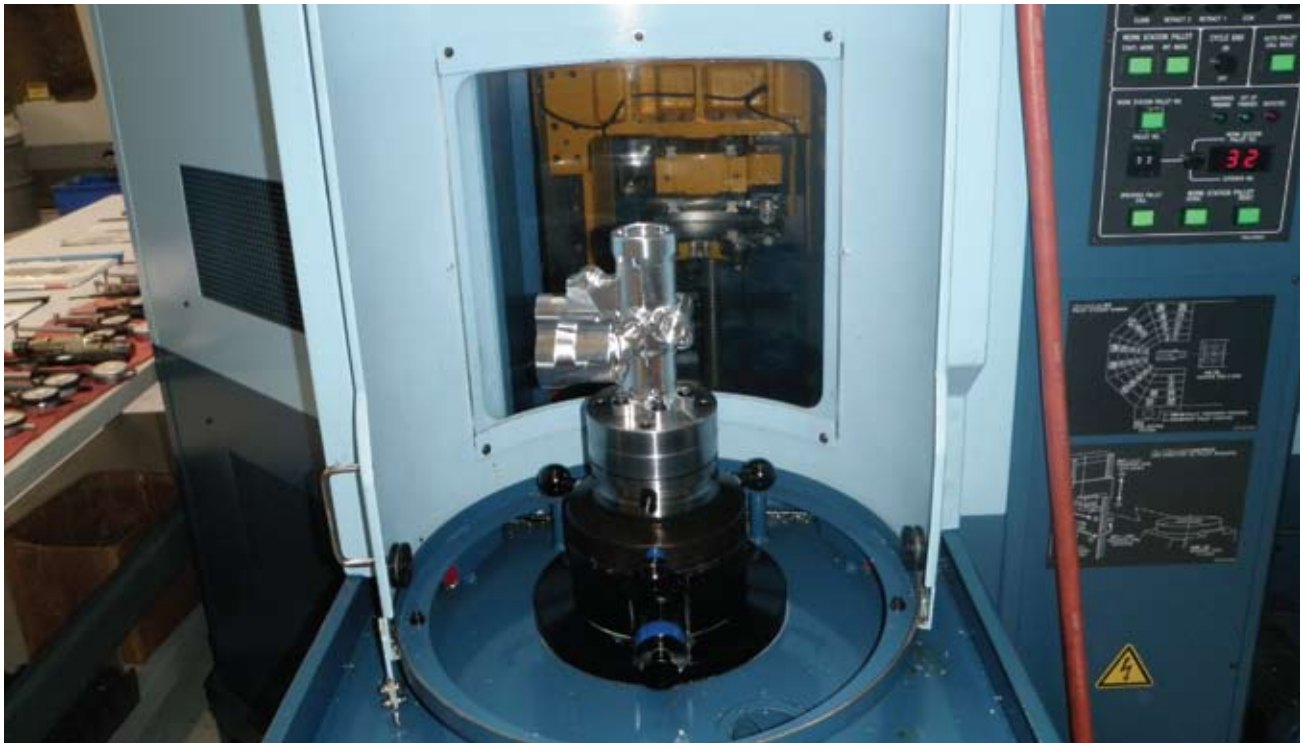
Aerospace work accounts for almost 80% of True Position's production. The aerospace parts typically machined at TPT are complicated manifold/valve bodies or fluid bodies—mission critical components. "We go after the stuff the rest of the world doesn't want," said David Blaine, manufacturing manager at True Position. "And we are holding accuracies to ±0.00025" [0.00635 mm]."

Today TPT's advanced cell manufacturing setup is a far cry from their earlier machining operations. In the past, jobs were run on three or four different machines and each associated operation required different fixtures and tooling. Additionally, each machine had a dedicated operator. It took a significant amount of time and repeated first-article manufacturing and inspections. Tools would need to be pulled, fixtures would be re-indicated to make changes, and there was still variation from part to part. Machine uptime was only 20–30%.

"We knew it was time to explore new manufacturing methods and techniques in order to optimize operations so we could offer our customers shorter lead times, reduced costs, and a higher level of overall satisfaction," says Allen Sumian, the founder and president of TPT.

Looking for a more efficient solution, TPT turned to Selway Machine Tools Co. for help. Selway educated them on Matsuura multipallet machining centers and introduced them to Methods Machine Tools (Sudbury, MA), the exclusive US importer of Matsuura machining centers. Sumian was cautious about the merits of buying a multipallet machine versus buying more machines—more machines mean more spindles. So Selway recommended that TPT test the success of multipallet machining with a Matsuura six-pallet, four-axis H.Plus 405 HMC with 240 tools.

The H.Plus-405 is capable of high feed rates and high-speed operation. The 12,000-rpm spindle with 80-mm bearings provides rigidity in tough materials and also maintains high accuracy. Offering a pallet size of 19.69 × 19.69" (500 × 500 mm), despite its



With the multipallet cell, complex, multifaceted aerospace parts can be completed in just two operations, according to TPT.

compact size, the H.Plus-405 provides a cost-effective horizontal solution for components of 27.55 × 33" (700 × 838 mm).

The multipallet Matsuura was assigned six "repeat-business" parts to the new machining center and TPT realized drastically reduced setup/changeover times, making the complex jobs run much more efficiently. The test was an overwhelming success.

During the time TPT was testing their first Matsuura, Sumian read *Lean Thinking*, a book by James Womack and Daniel T. Jones, which spurred him to bring in some lean manufacturing training, and this radically changed the way he approached manufacturing. Sumian set a new goal for his shop: zero setup time. He embraced multipallet machining as a way to eliminate the spindle downtime between parts.

Today 40–50% of TPT's aerospace work is conducted on two machining cells featuring Matsuura machining centers, which run untended on nights and weekends. One cell contains two Matsuura five-axis MAM72-35V VMCs, each with 32 pallets and a 240-tool magazine. The second cell comprises three Matsuura four-axis H.Plus 405 PC2/6 HMCs: one with two pallets and a 90-tool chain and one with six pallets and a 240-tool magazine. The large toolholders eliminated another cause of spindle downtime: tool changeovers. The machines hold all the tools needed to complete the parts loaded on them, so when one pallet is finished, the machine starts right in on the next. Once the parts have been programmed for the machines, there is zero setup time involved. These two cells are critical to TPT's operations, handling approximately 20–25% more manufacturing activity than all of the other cells in their facility.

TPT engineers appreciate the Matsuuras' ability to handle a variety of parts. "One part might be 6 × 4 × 4" [152 × 102 × 102 mm], another 8 × 4 × 3" [203 × 102 × 76 mm], but each part number needs its own fixture only for the last operation. We can load impellers, manifolds, fluid bodies, and valves on five different pallets at night, and when we arrive in the morning, 90% of the work is done. In the [morning] shift, we run a few fast-finishing operations like deburring or anodizing the part, or removing tooling from the machine, and we have five each of five different parts when we're done," explains Engineering Manager Jim Green.

TPT was not only able to eliminate setup times and machine downtime, they were also able to reduce the number of operators needed to manage their machining centers to just two people while increasing the amount of work they are able to execute. In true lean fashion, the excess manpower was redistributed into different areas. For instance, TPT has doubled the size of their programming and engineering department in the last year alone, in order to offer more sophisticated machining options for their customers. They've also been able to move out many of their older machines that have been supplanted by the Matsuuras, freeing up valuable floor space in their facility.

"The best part about the Matsuura machines is their ease of operation, repeatability, and accuracy," comments Blaine. "We can build a part complete in just two operations. We're so confident in their performance that we continue to run the cell, even before the first part can be inspected. Our record with the Matsuuras is flawless."

"With the proper machinery and technology in place, **lights-out is no longer scary."**

Sumian adds, "We have reduced our lead times, manual labor for parts, and part-fixturing costs for products manufactured in our VMC cell—all by over 50% because we can typically complete a part in two operations rather than four, five, or even six, as was done previously."

One example of the time and money the cells have saved the company is a complex housing that goes into an assembly for an aerospace customer. The part is machined in 15-5 stainless and features multiple compound angles. Machining this on TPT's previous equipment required many different operations and each angle had to have its own tooling. It was taking three days to make one part and 20% of the parts were being scrapped. With their new machining cells, TPT was able to redesign the tooling and fixturing and run the parts in only two operations. They are now producing two parts per day—one part on each shift—and now none of the parts are scrapped. In fact, the process works so well, the workpiece has become a standard, stock-numbered part.

When asked if the cells have helped business, Sumian beams, "We have increased our sales over 12% per year for the last two years—in part by having our customers parts manufactured in our Matsuura cells."

Sumian also estimates TPT's productivity gains to be in excess of 50%, due to the fact that the Matsuuras run "lights out" through evenings and weekends. "When Dave [Blaine] and I go home on a Saturday, we hear the machines running as we close up the shop doors and it gives us a feeling of satisfaction and success," says Green.

"When I arrive in the morning I get a similar sense of satisfaction. I unlock the doors and hear all the machines still running and know that parts are going to be spot-on," echoes Blaine.

To run a fully successful "lights-out" operation, Blaine recommends deploying key Matsuura options such as Broken Tool Detection and Tool Life Management. "These options give you a comfort zone, knowing that if a tool is broken or worn the machine will stop or go on to machine a different part. You know you're not going to come in the next day and discover parts need to be scrapped," explains Blaine. "With the proper machinery and technology in place, lights-out is no longer scary."✈