

Mission Improbable at Aerospace Shop

Prigel Machine (Hood River, OR) celebrated its 10th anniversary in 2012. In December 2002, after many years of working as a lead technical specialist supporting injection molding for wind-surfing products, Brian Prigel pursued his dream of owning a small machine shop. These were difficult economic times, but there was one advantage: shops that were going out of business were auctioning off excellent used equipment. Prigel bought some and began networking for customers.



Brian Prigel (left) and production manager John Van-BySteren inspect structural bulkhead components for an unmanned aerial vehicle launcher at Prigel Machine.

Like many small machine shops, Prigel traveled the path taken by many—beginning with manual equipment, growing, and then adding CNC equipment and advanced Mastercam software from CNC Software Inc. (Tolland, CT) to do the CNC programming. At the outset, Luck was on Prigel's side. A nearby start-up company that was producing unmanned aviation system drones needed a person with Prigel's skill set. Over the next few years, this customer was joined by others. These customers needed parts for the cameras and avionics used by drones, for ground support equipment—such things as catapults and “skyhooks”—and matched compression molds for making carbon-fiber composites. Prigel Machine had officially launched itself into a fertile niche.

Prigel and his staff programmed CNC equipment manually at first, and then with inexpensive CAM software with limited features. “In 2006, I hired a production manager, and he convinced me that I needed to purchase Mastercam to keep pace with the

volume and growing complexity of the parts customers were sending us. I did it and we haven't looked back,” says Prigel.

The company now has 11 CNC machines that are programmed with four seats of Mastercam, one multiaxis, two mill level 3, and one lathe. Prigel himself is one of the three programmers. Having limited CAD/CAM experience, he admits that he struggled with the software at first. However, a tenacious self-learner, he soon discovered where everything was in the program. Now he can't see how his company could possibly get along without it.

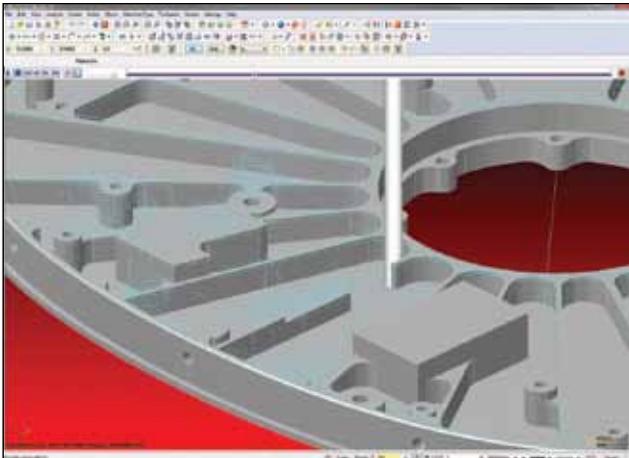
The many benefits that Mastercam offers the shop for CNC programming include precise tool control, high-speed 3-D toolpaths, and power programming.

Without total control of tool movements with Mastercam's precise tool control, it would be difficult, if not impossible, to fulfill the design intent for many of the unique parts Prigel Machine's customers send their way. Prigel believes that anything his customers can design on their CAD systems, he can program for machining on his CAM system.

“A lot of people that come directly out of school or don't have the machining background do what I call black box programming where they just take the defaults and whatever comes out is what they get,” says Prigel. “I approach it differently. Having come from manual machining to CNC, I always know what I want the tool to do. I have never encountered a situation where I couldn't get Mastercam to make the tool do exactly what I wanted it to.”

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Prigel Machine has maintenance licenses for Mastercam, which entitles the company to free upgrades and unlimited support. So Mastercam users at Prigel are always learning about new ways to use the program to accomplish manufacturing objectives more efficiently. Recently, the company has been taking advantage of an array of 3-D high-speed toolpaths that provide more tool engagement with a shallower depth-of-cut to improve machine cycles and reduce



Mastercam's high-speed horizontal toolpath automatically detects flat areas on a part model like this aerial camera base and executes efficient cutting motions to finish the part, improving programming productivity and CNC machine cycles.

tool wear. They allow the company to machine very complex parts with as few as four operations.

As an example, Prigel cites a thin-walled camera bracket his company manufactures. It calls for a significant amount of pocketing to remove about 99% of the weight from the workpiece. He estimates that those complex operations would have taken twice as long using conventional toolpaths. He also says that these types of cycle reductions are now being applied to about a quarter of the machining operations in his shop for substantial savings.

Of course, cycle time reductions of this magnitude could be obtained in CAM programs generated by other types of software. But they would involve laboriously going back through the program and manually adjusting settings at many locations throughout the program. Prigel's cycle reductions were obtained immediately after initial programming with no subsequent adjustments.

About one-quarter to a third of the jobs flowing through the shop are prototypes. These parts frequently require complex programming and result in short runs. So there is little margin for error before the profit margin on a job can be lost completely. In spite of the difficulties that prototyping presents, Prigel is committed to doing this work, because it cements relationships with the customer and leads to more profitable production work.

Using the CAD system's powerful interface that puts frequently used tools at the operator's fingertips and automated toolpaths that reduce the need for numerous operations, re-

duces programming work that used to take days down to hours. Once a program is completed, Mastercam's computer simulation features, Backplot and Verify, are used to automatically determine that the program will run on the machine tool without crashing and that it will indeed remove a sufficient amount of material to meet specifications.

Prigel Machine is positioned in markets with upward trajectories, and the future looks solid as long as it can acquire or evolve the talented human power resources it needs to keep its CNC equipment operating efficiently. Steady growth has required that more of Prigel's and his production manager's time are devoted to activities other than programming parts. This means that the company is currently short at least one programmer and will be looking for even more in the months ahead. If the prototyping volumes keep up, Prigel estimates that one seat of Mastercam will be required to support three CNC machines. That means more of his machinists, ideally all of them, will need to be skilled programmers.

The company is exploring a number of avenues for obtaining or growing people with these skills. They include using the services of its reseller, MCAM Northwest (Oregon City, OR), to do more training; hooking up its own machinists with self-paced learning programs such as Streaming Teacher; and working with his local Technology Alliance to encourage local educational institutions to devote more of their resources to manufacturing education.



Brian Prigel, who is one of his company's primary CAM programmers, believes there is something that can be done to meet the critical nationwide shortage of qualified Mastercam programmers.

Since 2003, Prigel Machine's sales have been progressively higher every year except one. Now the company plans to break ground for a new facility to accommodate this growth in the spring of 2012. **ME**

For more information on Mastercam/CNC Software Inc., go to www.mastercam.com, or telephone: 860-875-5006.