

# CASE STUDY

## Efficient Machining Strategies from CAMWorks® with VoluMill™ Help Tomak Precision Boost its Efficiency and its Bottom Line

The people at Tomak Precision ([www.tomak.com](http://www.tomak.com)), Lebanon, Ohio, know what the right technology in the right hands can do. Tomak is a job shop that prides itself on its advanced manufacturing technology and highly skilled individuals. It sees this mix as giving it the edge it needs to serve demanding customers in the aerospace, medical, machine tool and other industries, handling everything from prototype work to short lots to full production runs. It makes employee training a top priority, and evaluates new manufacturing technology on an ongoing basis.

"Business conditions permitting, we try to buy a new piece of equipment once a year," says A.J. Schaeper, Jr., general manager of Tomak.

Similarly, like other progressive metalworking shops, the company



GEO-1119A: Tomak's 20,000 sq.ft. of manufacturing floor space includes four Swiss Machines and sixteen lathes

tries to stay abreast of advances in software as well, particularly CAD/CAM. "Moving from customer drawings to machining programs as rapidly, accurately and efficiently as possible has a major impact on our productivity and profitability," notes Schaeper. That has been born out over the last few years by Tomak's experience with CAMWorks® ([www.camworks.com](http://www.camworks.com)), an intelligent and intuitive solids based CAM solution from Geometric Americas, Inc., ([www.geometricglobal.com](http://www.geometricglobal.com)), Scottsdale, AZ. It provides an array of tools to simplify and automate even complex programming tasks, speeding design and programming changes.

Moreover, its intelligent connection between the solid model and toolpath generation provides associativity between CAD and CAM functions. This allows CAMWorks to identify and recalculate toolpaths based on the changes to the part model. For example, when the depth of a pocket is changed, CAMWorks can update the toolpath automatically.

CAMWorks also supports CNC programming of multiple parts for production machining and offers an accurate representation in a virtual machining environment. The design and layout of machine components, parts, work pieces, clamps and fixtures provide a realistic representation of the machining

environment. This helps out operators on the shop floor, who have access to setup documents that show where the parts and fixtures are positioned on the machine.

A key aspect of CAMWorks is its seamless integration with SolidWorks®, the powerful features-based CAD program that's widely used by progressive companies, including many of Tomak's customers.

"The fact that it allows you to work in SolidWorks was an important feature of this software for us," says Schaeper. "We have customers, who send us solid models created in SolidWorks, so being able to accept and work with them within our CAMWorks environment is a major timesaver."

"The advantages are huge," agrees Arlie Branham, Tomak's programmer. "In the past when we received a solid model from a customer, if I then had to rebuild that model it could take anywhere from an hour to three days, depending on the complexity of the model. But being able to import their model into CAMWorks, and work directly from it so that we are not reinventing the wheel is much more efficient and faster."

How much faster? Branham estimates the savings to be between 10 and 50 percent, again depending on its complexity.

But that's just for starters. Perhaps because he began his career as a milling machine operator, Branham has a keen appreciation of the importance of accurate toolpaths. CAMWorks helps Tomak generate them.

"With the software's simulation you can run your machining program and verify everything right on the screen," he notes. "You can quickly see if your tool doesn't have enough flute length, if the corner radius on your tool is too big or too small—see if you are going to crash. Being able to do things like that, without ever putting tool to metal, is a major money saver."

The software has also been a plus on the tooling side. "You can actually draw the optimal tool that you need for the job if it's not already available in the CAMWorks tool library," observes Branham, "and once you draw it you can use that tool in the simulation. This has removed a lot of the guesswork out of tool selection, which is particularly important for our business since a lot of parts we do are very complex and place a variety of demands on the tooling."



GEO-119B Tomak processes an aircraft engine parts fixture on its Fadal VMC 6030

Branham notes that the software's ability to quickly and accurately generate machining programs from imported solid models has enabled Tomak to win jobs and, in at least one case, "It actually enabled us to make a part that we wouldn't have been able to make."

These and other knowledge-based attributes, such as CAMWorks' Automatic Feature Recognition (AFR) with its ability to automatically identify and define prismatic machinable features, have helped Tomak weather the economic storms of the latter part of the decade and emerge strong and profitable. That's probably enough to hope for from one software investment, but things recently got even better thanks to YouTube.

YouTube?

Branham explains: "YouTube is one of the best tools in my toolbox. I type in generic headings like 'milling aluminum,' or 'high speed machining,' and just see what comes up."

One video in particular caught his eye. It showed a roughing operation on stainless steel being performed with an exceptionally high metal removal rate. The software that supposedly made this possible was VoluMill™.

"I did some digging, calling up other videos featuring VoluMill. The videos contained considerable information as far as material, depth of cut, speed and feed, how long the tool was in the

cut, and cubic inches of material removed. I saw those numbers and at first I thought they were stretching the truth. I looked in to it more and realized that this was for real. This was a game changer."

VoluMill is an ultra-high performance toolpath (UHPT) software that uses high-speed continuous tangent motion rather than sharp, interrupted movements. It plans the toolpath based on abilities designed into the machine and cutting tools. By taking advantage of the capabilities of modern machining hardware and avoiding sharp directional changes, it generates toolpaths that assure the machines and cutting tools are used at peak efficiency given the conditions of the application.

Because there are no abrupt changes in direction or to the volume of material encountered, the load on the cutting tools and spindle never exceeds user-programmed limits. Consequently, machines run smoothly and tools run cooler, even at much higher speeds and feeds, extending tool and machine life. It easily cuts pockets, steps, slots, channels and other shapes, and can handle an unlimited number of material and part boundaries and islands. It can be used with any material, including hard metals.

Branham took this discovery to his boss, A.J. Schaeper, Jr. After some additional study both were convinced that VoluMill was a must-have, fitting



GEO-119C Using VoluMill with CAMWorks,  
Tomak is able to develop fixtures to hold aircraft engine  
parts for fast hole EDM

perfectly with Tomak's ongoing drive for faster, more efficient, and thus, more cost-effective machining.

But they didn't buy it. Not, mind you, because they got cold feet, but because they discovered that VoluMill would soon be offered as a fully integrated milling toolpath engine within CAMWorks 2011 for 2.5 axis and 3 axis roughing operations. They took delivery of CAMWorks with VoluMill in March of 2011.

"We were one of the very first shops to get CAMWorks 2011 with the integrated VoluMill option," says Branham.

And how integrated is it? "It's virtually seamless. Within CAMWorks you have a roughing tab with a drop down menu. On the menu there are a number of different options you can choose. VoluMill is one of them. You pick VoluMill and put it to work for you. It's that simple."

Branham says that the single biggest thing that drew him to VoluMill as a buyer was the efficiency of the paths, "There is no wasted motion. For example, when you calculate an internal corner there is a whole lot of math involved. CAMWorks VoluMill does most of that math for you, saving an average of 50% of machining time for these features."

"If you are removing a lot of material on an exterior you have to create numerous toolpaths to get the tool to step in so it doesn't get overloaded. VoluMill keeps a constant radial load on the tool, it never deviates. If you tell it twenty thousandths stepover it will do that every time. There's no other software that I am aware of that

does that."

This ability to generate optimal roughing paths with maximum material removal rates has reduced cycle times, in some cases by up to 80% and increased cutting tool life, in some instances by up to 500%. Advantages like these, coupled with the types of efficiencies they had already been experiencing through CAMWorks, have proved to be a significant competitive weapon for Tomak.

Schaeper succinctly summarizes the situation this way: "CAMWorks allowed us to get business we didn't have before!"

Tomak now has two seats of CAMWorks 2011, one with VoluMill.

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