

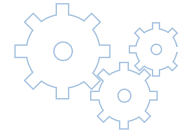
AFC TOOL

A division of FC Industries
DAYTON, OHIO U.S.A.

INDUSTRY CASE STUDY



Developed by
Celeritive™



Dayton's AFC Tool Sees "Incredible" Material Removal Rates, Decreased Cycle Time and Tool Optimization With VoluMill™ Ultra High-Performance Toolpath Engine.



DAYTON, Ohio – As a supplier to industries that demand near perfection in price-sensitive markets, AFC Tool, a division of FC Industries, is always on the lookout for ways to improve productivity, manufacturing processes and the bottom line. It found one way with the high-performance toolpath engine VoluMill™.

Based in Dayton, AFC Tool is a single-source design, tooling and finished manufacturing operation that serves the medical, automotive, food and beverage, pharmaceutical, energy and aviation industries.

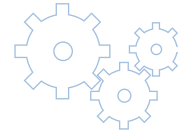
AFC strives to meet each client's unique needs by using a flexible approach to find the right market-driven solution for a client's problems. The company also prides itself on its communications with customers and quick project turnaround.

"We are continually investing in new equipment and technologies to maintain and enhance our competitive position," says Jeff Perry, operations manager of FC Industries. The VoluMill acquisition fits right in with that mantra.

Toolpaths generated by VoluMill produce a highly consistent material removal rate with very low forces. The high consistency and low forces enable manufacturers to achieve the highest material removal rates that their equipment can obtain. Reduced forces on the spindle and cutting tool enable milling machines and cutting tools to be safely utilized at their full capabilities. Uniform chip formation and excellent heat dissipation result in the previously unachievable combination of dramatically reduced cycle times and significantly extended cutting-tool life.

AFC's first experience with VoluMill came on assembly and gauge yoke details for tubular assemblies, which are used in the automotive and aircraft industries for both assembly- and checking-fixtures. It is not uncommon for an assembly fixture to contain 15 to 20 yokes of various sizes. These are made from D2 or 4140 plate stock and are .75 to 1.5 inches thick.

Prior to implementing VoluMill, AFC Tool used a 1-inch diameter Mitsubishi AJK high-feed insert cutter to rough the part at a material removal rate of 1.44 CIM with a feed rate of 103.1 IPM and a spindle RPM of 1,719. The end result was a cycle time of 13:29.



Seamless Integration with Siemens NX CAM

Using VoluMill seamlessly with its Siemens NX8® CAM system and a .625-inch diameter, 5-flute HEV-5 end mill from Helical Solutions, AFC Tool was able to increase the material removal rate to 5.89 CIM and up the feed rate to 158.3 CIM with a spindle RPM of 6,021. The bottom line is a cycle time of 2:45.

“These material removal rates – above machine and tool manufactures specifications -- are incredible,” says Barry Davidson, AFC Tool’s CAM Programmer/Designer. “Using 5-flute end mills we are able to move large quantities of material easily without sacrificing tool wear. We manage tool wear so mills are not just used once, but are sent out for sharpening before failure. The tools that we have had sharpened function just as well as a new tool. VoluMill has cut the tooling cost on projects.”

As important to AFC Tool as the reduced cycle time is VoluMill’s ease of use.

“User interface is same as in Siemens NX so there are no special terms to learn,” Davidson explains. “Because of that, the learning curve for implementing VoluMill has been very short.”

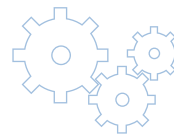


Davidson also reports that changes to a part’s CAD model are easily updated to geometry changes within VoluMill. Engage feed/speeds and non-cutting moves are all figured internally with the path so there is no need to edit.

“VoluMill manages RDOC very effectively and will not exceed the input values,” Davidson says. “This has enabled programmers to add a path and have confidence there are no spikes in the material thickness. This eliminates the need for multiple program verifications and edits.

“The software’s Active Chip Thickness Calculator is a great tool,” he adds. “This helps users figure speed and feed calculations without having to go outside the session for other calculators. Being able to calculate speeds and feeds by chip thickness, speed, step-over, etc. and see the results helps greatly.”

Bringing VoluMill into its operation allows AFC Tool to be more flexible, allowing support machine tools to rough out large parts for molds, dies and other fixtures, freeing more-refined CNC machines for more intricate projects.



VoluMill - Proven Success

“VoluMill’s proven and constant material removal enables programming for almost any machine at the facility,” Davidson says. “This enables “hot” jobs to be roughed as soon as any of our three-axis machines come open.

“Overall AFC Tool is very happy with the addition of VoluMill,” says Davidson. “The software is easy to use and has increased material removal in all types of material. The programs output by VoluMill are very stable and machine well. A programmer need not be an expert to use the software effectively.”

Application Parameters

Part Description: Assembly and gauge yoke details for tubular assemblies

Material: D2 or 4140 plate stock .75- to 1.5-inch thickness

	Old Parameters	New Parameters
End Mill	Mitsubishi® AJX	Helical Solutions® HEV-5
End Mill Dimensions	1.00-inch diameter	.625-inch, 5-flute
Cycle Time	13:29	2:45
RPM	1,719	6,021
IPM	103.1	158.3
ADOC	.035 inches	.800 inches
RDOC	40%	7%
MRR	1.44 CIM	5.89 CIM
Spindle Load	NA	Less than 30%