

Magnus Hi-Tech Industries Inc., ([www.magnusht.com](http://www.magnusht.com)) Melbourne, Florida, is good at what it does: providing high quality solutions to the full range of its customers' fabrication needs. Using advanced sheet metal fabrication and machining technology, coupled with rigorous quality methodologies, has enabled Magnus Hi-Tech to win a host of customers in the defense, aerospace, medical and other demanding fields.



*Figure 1: Simultaneous cutting of a battlefield override chassis on one of the 5-axis Mazak Machining Centers at Magnus Hi-Tech.*

With a range of products that includes holding brackets and complex components for military simulators, plus housings, struts, mounting blocks, impellers, and military chassis to name just a few, the company is called on to respond quickly and efficiently to a diverse array of fabricating and machining needs. They do this through an equipment lineup that includes laser cutting and electrical discharge machining (EDM) as well as CNC turning and milling machines.

The newest member of this lineup is a Mazak 5-axis CNC milling machine. "It is able to machine five sides of a cube in a single set-up, drastically reducing changeover times and machine downtime," reports Mike Blake, Methods Engineer / Program Manager for Magnus Hi-Tech. It also has the ability to perform its own in-machine measurements and data collection with a CMM-type touch-probe, essentially self-adjusting its programming and tooling to ensure close tolerances are maintained by monitoring tool wear and part-to-part variations.

The Mazak is an impressive machine and one that reflects Magnus Hi-Tech's commitment to high quality, precision machining and fabricating. However, part of being good is knowing that you are never good enough, and this commitment to

continuous improvement led the company to seek a way to reduce engineering and CNC programming times and decrease time to market. They found it in CAMWorks®. ([www.camworks.com](http://www.camworks.com)).

CAMWorks is an intelligent, intuitive, solids-based CAM solution from Geometric Technologies, Inc., (Scottsdale, AZ), a subsidiary of Geometric Limited. It provides an array of tools to simplify and automate even complex programming tasks, speeding design and programming changes. Its intelligent connection between the solid model and tool path 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 of the 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 not only helps the manufacturing engineer as he develops the program, but also the machine operator on the shop floor,

who has 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 used by many progressive metalworking shops, including Magnus Hi-Tech. “We offer our customers a fabrication house that can produce their products from prototype to production,” says Blake. That journey from prototype to production is rarely a straight line. Changes frequently occur as problems and opportunities surface, and those changes can be time-consuming. “We used to have to reprogram the whole part with our previous CAM software,” recalls Blake, “or else use the CAD package associated with that software, which would not bring our SolidWorks model up to the new revision.”

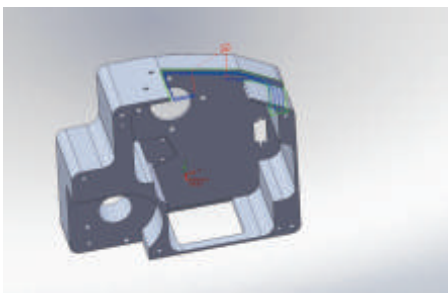


Figure 2: CAMWorks® generated tool path for a battlefield chassis

They purchased CAMWorks, in part, in the hope that it would eliminate such problems. They were not disappointed.

“There have been parts, for instance, where a customer has needed to move some hole positions, or a pocket was moved to a different location. We used to have to reprogram the model. With CAMWorks, which can work inside SolidWorks, we just change the model to the new revision, automatically regenerate the tool path, then repost it to our Mazak mills and we're ready to run.

“CAMWorks' ability to automatically accommodate changes to the part model, eliminating a lot of time consuming CAM system rework due to design updates, makes true associative machining possible. Time savings are considerable.” This type of scenario is not uncommon, says Blake, and with some customers, it's routine.

One of the ways in which CAMWorks is able to speed CNC programming is through Intelligent Machining, a suite of tools pioneered by Geometric Technologies that automates the generation of toolpaths.

Within this suite, Automatic Feature Recognition (AFR) has the potential to cut hours off the time it takes to move from design to finished part through its ability to automatically identify and define prismatic machinable features.

AFR Technology does this by analyzing the solid model geometry and identifying mill features such as holes,

slots, pockets, and bosses; turning features such as outside and inside profiles, faces, grooves and cutoffs; and wire EDM features such as die openings. AFR recognizes these features regardless of the CAD system in which they were created.

Further speeding the design to machining process is Geometric Technologies' TechDB™ (Technology Database). Using knowledge-based machining technology, the database associates tooling, machining strategies and parameters to the features. When operations are generated, CAMWorks applies these settings automatically. Significantly, the rules in the TechTB are fully customizable, enabling companies to incorporate their best practices.

“I routinely use Automatic Feature Recognition in creating fixtures for our machining operations,” notes Blake. “Together with the Technology Database it enables CAMWorks to automatically select the right drills and taps. We used to spend most of the day programming fixtures - not anymore.”

Blake cites a major project that Magnus Hi-Tech recently completed, machining critical components for a military chassis. Consisting of a series of complex prismatic parts, the job had to be done accurately and on time. Using CAMWorks, Magnus Hi-Tech was able to create complex machining programs for its Mazak five-axis mill in optimum times, quickly make any required revisions,

## CAMWorks

CAMWorks is the first fully integrated computer-aided manufacturing (CAM) software designed exclusively to operate in SolidWorks and the first to offer knowledge-based, feature recognition and associative machining capabilities within SolidWorks. CAMWorks uses the same SolidWorks geometry to generate toolpaths to ensure the part you machine is the same part you've modeled.

CAMWorks helps manufacturers across aerospace, automotive, electronics and medical industries optimize and evolve their CAM automation process. CAMWorks modules are available in a variety of combinations and bundles: 2½ Axis Milling 3 Axis Milling 4 and 5 Axis Prepositioning 4 and 5 Axis Simultaneous Milling 2 and 4 Axis Turning Rotary Milling 2 and 4 Axis Wire EDM



and generate designs and toolpaths for the needed fixtures. The result was a win for both the military and the company

Summing up, Blake notes that CAMWorks' tight integration with Magnus Hi-Tech's SolidWorks environment facilitates true associative machining, so that any revision to a part design updates the SolidWorks solid model as well as the CAMWorks file, permitting CAMWorks to automatically generate the new toolpaths, the tool list and, if required, the fixture modifications as well. This has resulted in time savings on revisions ranging from 20 to 60 percent.

The drawback is that an array of features this powerful must be difficult to install and learn, right? Wrong says Blake.

“CAMWorks is very easy to install. The standard CAMWorks is easy, and the more advanced stuff like 5-axis machining is not too hard once you have an understanding of how the toolpathing works. In addition, the interface is clean and easy to understand.”

Similarly, support - an obstacle in many software applications - gets high marks. “I have always had support when I asked for it. Everyone I've talked to was very easy to work with.”

Looking ahead, both CAMWorks and Magnus Hi-Tech, which now has two CAMWorks seats, seem to be similarly focused. “CAMWorks is always making improvements to their product and staying abreast of technology,” reflects Blake, “that is the same philosophy we have at Magnus Hi-Tech.”

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### About Geometric

Geometric is a specialist in the domain of engineering solutions, services and technologies. Its Desktop Products and Technologies (DPT) business unit develops cutting-edge point productivity solutions that enhance design and improve manufacturing operations. The enduser products from Geometric include CAMWorks®, eDrawings® Publisher, DFMPro, GeomCaliper® and 3DPaintBrush™, and the key technologies are NestLib®, Feature Recognition (FR), GeomDiff and 3DSearchIT®. Geometric licenses these technologies to OEM partners and also designs and implements customized process solutions using these technologies for industrial customers.

For further details about Geometric's DPT business unit, please visit [www.geometricglobal.com/products](http://www.geometricglobal.com/products)

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