



PRECISION ENGINEERING

Crucial investment for subcontractors

Providing high-precision engineering services to a range of demanding sectors such as aerospace, defence, medical hardware, pump & food processing industry, systems integration and automation equipment, as well as motorsport, Flexible Machining Systems (FMS) ensures its machine tools are safe with NC program verification software from CGTech.

Praveen Koti

Horsham-based FMS is currently a supplier to the medical, aerospace and defence sectors, which includes scheduled work released against contract requirements. The company recently received AS9100 approval and is intending to expand its customer base within these sectors.

Although commercial engineering jobs are undertaken by the company, it is predominantly

equipped to machine high-precision parts. A significant capital equipment investments have been made during the past five years, in updating machining centres and turning capacity together with inspection. Majority of the milled components produced by the company are programmed offline. This high-precision job is supported by a robust IT infrastructure running market-leading software such as Vericut from CGTech.



Vericut protects multi-axis machine tools from potential collisions

Ensuring the right codes

Peter Smith, Technical Support Manager, FMS, explains on the three distinct but entwined software steps of the company, "We are utilising *SolidWorks* CAD and *OpenMind* as our CAM system to create NC cutting tool paths. These files are transferred to *Vericut* where we verify the CNC code for the part before performing the machining operation."

Where 3D models are issued, FMS imports the customer data in STEP format. If the company is issued with 2D drawings, it always builds a 3D model to work from. The model is passed seamlessly into the CAM system and the NC code is transferred to *Vericut*. "This ensures that we have set up the part correctly in the CAM system, and that we will machine it correctly. We complete a virtual reality machining operation through *Vericut*, and if there are any mistakes in the program, the software will find those, and highlight what exactly is wrong. It will tell us if we have taken too much material off or if further material needs to be removed," avers Smith.

CGTech modelled all machines for FMS, providing a virtual representation of every machining centre. As some of the 3-axis vertical machining centres can be fitted with a fourth axis rotary unit, these have also been modelled to cover every production scenario.

A perfect model

The company builds the manufacturing process from the CAD system and gathers all data needed in the software. Every cutter and tool-holder employed by the company is held in a database with around 4,000 combined variations. These can be selected in the CAM system and the tooling data is transferred into *Vericut*. All datum points are also taken across and issued as part of the machine setup procedure.

FMS has been utilising solid modelling for over 10 years and *Vericut* for around five years. As the components produced by FMS have become more complicated, the need to prove that the job is right when it leaves the CAM office has evolved. "With jobs becoming more complex, we need *Vericut* to prove that we have done it right, because one can miss bits and the software will pick it up every time. In fact, the software is so well thought of that one of our aerospace customers insists that all their parts go through *Vericut*, and they will monitor and audit us on this requirement," states Smith.

Machining complex parts was the reason for a recent investment in a Mazak *Variaxis* 5-axis machining centre. Smith elaborates, "The multi axis machine can perform five-sided machining operations. And, sometimes we can finish a part in a single setup using special fixturing and snap tags. We installed

the CAM system to support the 5-axis machine tool, and had to have the post processor written for the machine. To prove the post processor, we run it through *Vericut*, and if an error was identified, it could be corrected – using *Vericut* allows one to see exactly what is happening. This worked well because all problems with the post were found straightaway. *Vericut* ironed out all of the issues within the post processor."

One of Peter Smith's responsibilities is making the company more efficient by getting the most out of machine tools. As far as he is concerned, multi-axis machines are the way ahead, machining parts in few setups and operations. He further confirms, "If one is using multi-axis machining techniques, *Vericut* is crucial. It minimises the risk of having a collision. It is much easier to correct it virtually in the CAM system than face the problems associated with an actual collision."

Changing the course

No milling programs are manually edited at FMS and any changes are made in the CAM system and re-processed by *Vericut* to confirm the changes are correct in the machine. "We are eliminating as many errors as possible upfront. It is much more efficient for a business to run a verification process, and *Vericut* is the best one available. The CAM system offers verification but it does not check the G code of the actual program. *Vericut* is driven by the actual NC program so every motion is a response to the driving code and the software will act exactly as the machine will, which makes a huge difference," concludes Smith. 📌



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