Machine Centric CAM

Machine Centric CAM software is aware of the limits of the machine being programmed. Until recently, CAM software assumed infinite capabilities for machines being programmed. Unlimited travel in each linear axis, infinite rotation abilities in each rotary axis became the norm and companies needed to add software like Vericut, NCSimul, IMS Verify to check for over travel or over rotation problems. Or users waited for alarms on the machine when attempting to run the program.

When these obvious problems are added to tolerance issues, many programs that looked good still make scrap. When dealing with rotary axis machines, this is even more of an issue.   Many machines will rotate infinitely, in 1 degree increments. When your CAM systems calls for a rotation of 20.500 degrees and your machine only rotates to either 20 or 21 degrees, you are probably making scrap. Some of this is handled in post processors, but they usually either round or truncate. No alarm sounds, but the part being machined will not meet a tight tolerance. A 0.50 degree difference when cutting 6.0 inches above the center of rotation is really not close to where the cut should be. This is a great selling point for in-process probing.

Tolerance stacking also is an issue for tight tolerance parts. Your CAD model of the part has a tolerance. Is your tool setter perfect? Add in the tolerances of the machine being programmed and you begin to see the problem. As designs become more precise, more is expected of part makers and the tools being used.

CAM software makers are beginning to address these issues. There is a real push from CAM vendors for their users to have accurate models and capabilities of the machines being used. Programming a generic machine is still possible, but the push is on to program for a specific machine. In the mid-range, Gibbs started this process with the introduction of machine simulation and the accompanying Machine Definition Data file almost 10 years ago. At IMTS 2014, a range of vendors were pushing their new machine knowledgeable software versions. There has been a big push from vendors as diverse as Mastercam, Esprit, PartMaker, FeatureCAM, CAMWorks and others to get their users to get machine specific with their programming.

Gibbs has taken this to a new level with the release of GibbsCAM 2015. With an new and enhanced model of the machine and tooling, the software will not allow a user to program a move the machine is not capable of making. The user gets over-travel and over-rotation warnings when creating a process. This will force the user to rethink the process being used, before posting and long before a machine alarm or scrapped part. Eventually, this will eliminate or reduce the need for reverse post processors and G-code verification software. The mid-range CAM packages are all increasing their power and ability to handle more complex machines and processes.

Eventually, CAM software will have complete knowledge of the capabilities and limitations of the machine tool being programmed. When that happens, manufacturers who make parts using material removal technologies will make higher quality parts at lower costs. They will reduce the number of alarms during production. Scrap made when CAM software attempts to make a machine do something it is not capable of doing should be eliminated. The industry, particularly in the mid-range is not there yet. Gibbs has leapfrogged most of the rest, but there is more to do to achieve the benefits of total machine-centric CAM.

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