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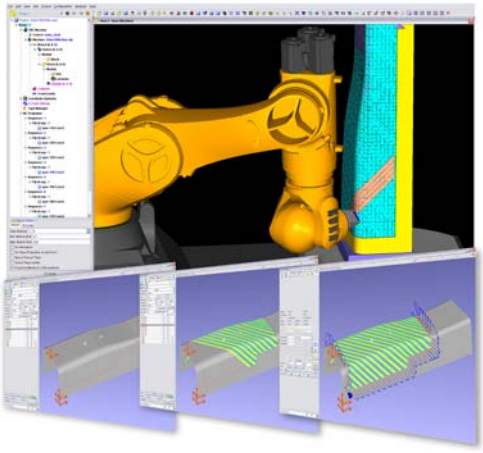
The Advantage November 2010

Software Developments for Programming & Simulating Automated Composite Lay-up Machines

One can hardly escape the excitement around the latest advances in automated composite fabrication machines: commonly called Automated Fiber Placement (AFP). Driven mostly by aerospace, but with technology quickly transferring to other industries, the race is on to develop productive automated composite lay-up machinery. In the same way cutting speed in "inches per minute" is boasted by manufactures of high-speed CNC milling machines, manufactures of AFP machines promote composite material application rates of "pounds per hour," while often ignoring other significant process complexities that must be addressed in order to produce parts quickly. The parallels don't end there however; just as CAD/CAM must continually evolve with new machining techniques, the software for programming AFP machines must also evolve to handle advances in technology.

Today's automated composite layup machinery and software has many similarities with the state of the CNC metal-cutting industry of the 1950's and 60's. The technology is difficult to adopt for all but the largest manufacturers because of the high infrastructure costs. The process technology is complex and only understood by few. And software is generally provided by machine manufactures, with different software required for each machine brand, resulting in limited software implementation and advances.

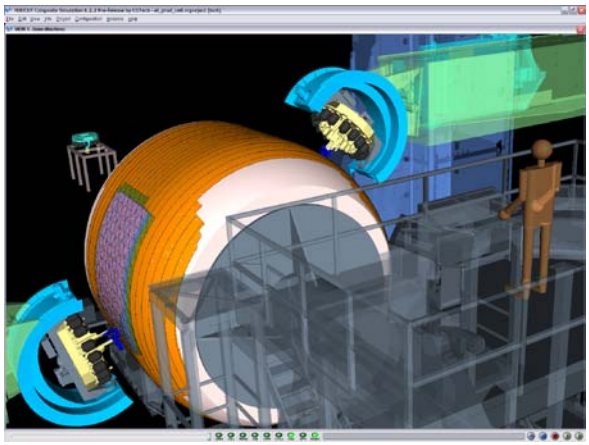


VERICUT Composite Programming and Simulation software is designed to be independent of any specific CNC fiber-placement machine, in the same way a modern CAD/CAM application supports CNC machining.

"When a machine tool builder is also developing the software to program their machines, the software tends to be restricted to the technology of the machine," said CGTech Product Marketing Manager Bill Hasenjaeger. "When software is separate from the machine and applied in a variety of applications, the software and underlying technology expands. The metal cutting industry has seen the same happen with advances in CAD/CAM."

For over 22 years CGTech has been constantly improving its VERICUT suite of software for metal cutting. But it was in 2004 that CGTech thrust full speed into the world of composites, after being contacted by Boeing (a CGTech customer since 1989) to develop a program for AFP machine simulation for 787 fabrication. This project progressed in 2005 to include the development of a programming solution for AFP machines. Since that time, projects have involved multiple types of AFP machines built by Electroimpact, mTorres, Cincinnati, Fokker, and others.

The VERICUT Composite Applications Suite is machine-independent off-line programming and simulation software for automated composite tape and fiber-placement CNC machines. It consists of two separate applications: VERICUT Composite Programming (VCP) & VERICUT Composite Simulation (VCS).



VCP reads CAD surfaces and ply boundary information and adds material to fill the plies according to user-specified manufacturing standards and requirements. Layup paths are linked together to form specific layup sequences and output as NC programs for the automated layup machine.

VCS reads CAD models and NC programs, either from VCP or other composite layup path-generation applications, and simulates the sequence of NC programs on a virtual machine.

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Material is applied to the layup form via NC program instructions in a virtual CNC simulation environment. The simulated material applied to the form can be measured and inspected to ensure the NC program follows manufacturing standards and requirements. A report showing simulation results and statistical information can be automatically created.

For more information on the VERICUT Composite Applications Suite, please contact CGTech at (949) 753-1050 or visit their website at www.cgtech.com.

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