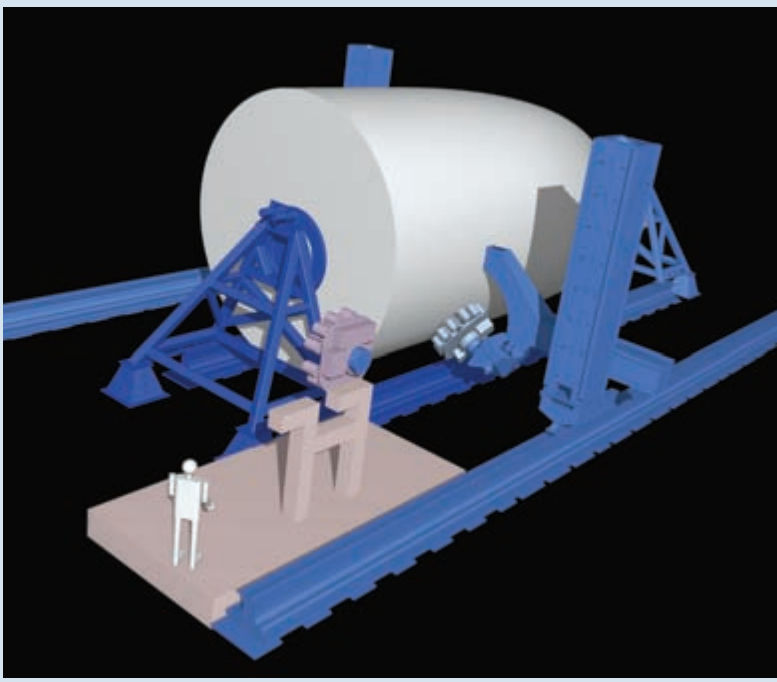
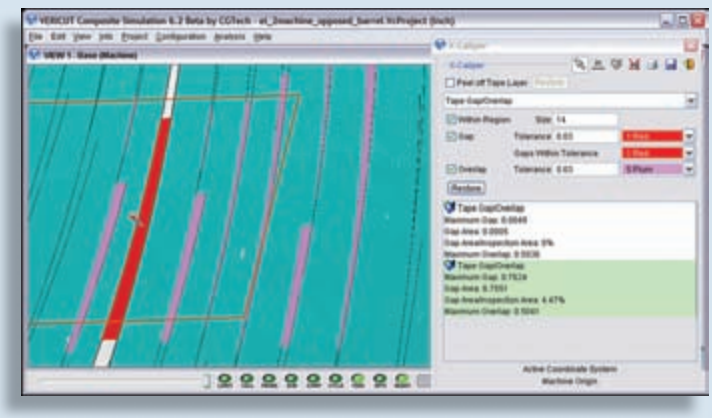
Putting the pieces together

Visitors to CGTech (hall 1, stand A4) at Farnborough 2008 will be able to learn more about exciting new software developments for programming and simulating automated composite lay-up machines



Vericut composite simulation | Part of the Vericut composite applications suite

One can hardly escape the deluge of recent articles and conferences focused on composites and the excitement around the latest advances in automated composite fabrication machines: commonly called automated fiber placement (AFP) and automated tape laying (ATL) machines. 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 speeds in 'inches per minute' is boasted by manufacturers of high speed CNC milling machines, manufactures of ATL and 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 and ATL machines must also evolve to handle advances in technology.

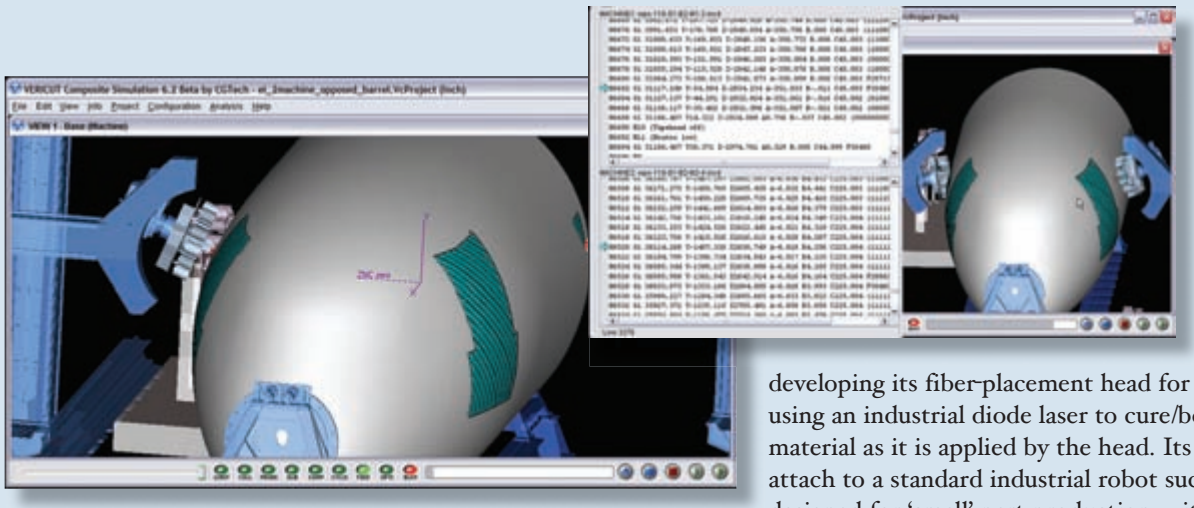


Today's automated composite lay-up machinery and software has many similarities with the state of the CNC metalcutting industry of the 1950s and 60s. The technology is difficult to adopt for all but the largest manufacturers because of the high infrastructure costs. The process technology is complex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

"There is a clear need for programming software to be provided by an industry recognised software provider as part of a standard suite of regularly updated and maintained software," says Peter Vogeli of Electroimpact, a designer and manufacturer of aerospace tooling and automation solutions. "The delivery of machines by competent machine tool vendors, with the delivery of programming systems by competent software vendors, mirrors practices in the mature metal removal industry. In that industry machine tool vendors generally no longer attempt to compete with far more competent programming companies."

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 its machines,

EVENT REPORT | FARNBOROUGH AIRSHOW 2008



VC | reads CAD models and NC programs

the software tends to be restricted to the technology of the machine," says 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 20 years CGTech has been constantly improving its Vericut suite of software for metalcutting, 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.

In 2006 Electroimpact was selected to supply Spirit Aerosystems with a multiple machine AFP lay-up cell for the Boeing 787 fuselage section 41. The composite lay-up cell features multiple independent machines each with automatic head changers, resulting in a high continuous lay-down rate, with no head service downtime. Electroimpact recognised that CGTech is very capable of providing machine independent AFP programming and simulation software. For nearly three years Electroimpact has been in a non-exclusive cooperation with CGTech to develop AFP programming and simulation software. Following more than two years testing and development, this software will be used by Spirit Aerosystems to program the new Electroimpact AFP machines being installed. The software will be updated and maintained by CGTech.

CGTech has also recently partnered with AFPT, a Dutch company developing a remarkable new thermoplastic fiber-placement head. AFPT uses carbon reinforced thermoplastic material (tape) that is instantly bonded when applied. Major aerospace and automotive companies are interested in thermoplastic materials because they require no, or at least much less, autoclave time compared to thermoset material.

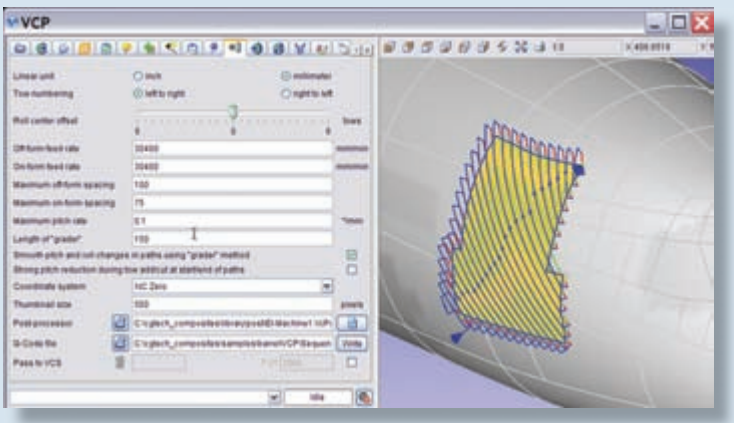
Where Electroimpact has designed AFP heads and machines for large aerospace parts, AFPT focuses on solutions to fabricate small composite parts using thermoplastic materials. AFPT has a 15 year history in filament-winding and considerable expertise in various composite materials. It has been developing its fiber-placement head for over three years and is using an industrial diode laser to cure/bond the thermoplastic material as it is applied by the head. Its head is packaged to attach to a standard industrial robot such as Kuka or ABB. It is designed for 'small' part production, with typically less than a three metre span. CGTech will be working closely with AFPT to apply Vericut composite software to meet thermoplastic lay-up requirements.

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) and 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. Lay-up paths are linked together to form specific lay-up sequences and output as NC programs for the automated lay-up machine.

VCS reads CAD models and NC programs, either from VCP or other composite lay-up path-generation applications, and simulates the sequence of NC programs on a virtual machine. Material is applied to the lay-up 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. |

www.cgtech.com



VCP | Vericut composite programming