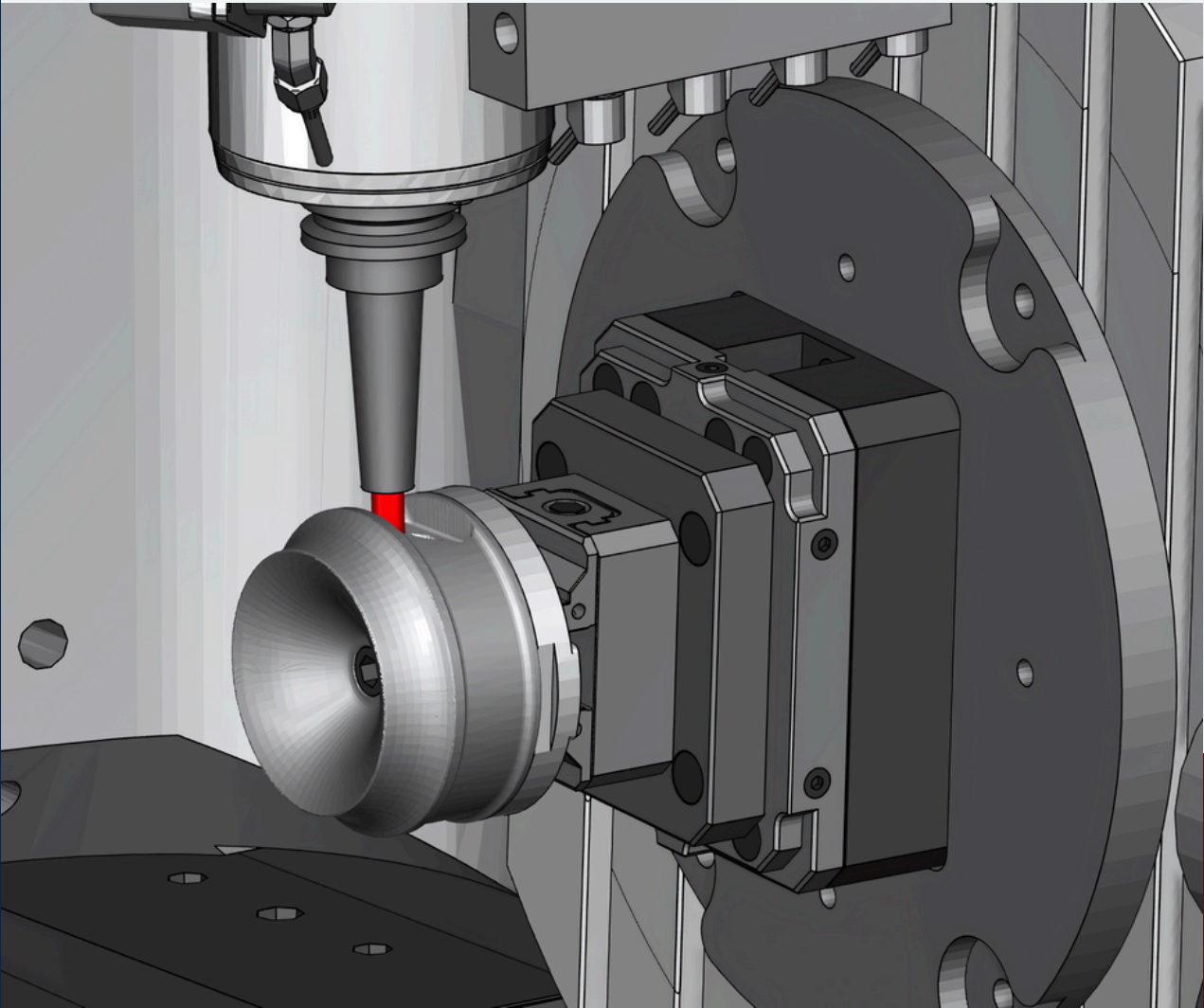




WWW.AIM-CNC.COM

WHITEPAPER 2024

INTRODUCTION



At AIM (Advanced Innovative Manufacturing) , we don' t just address inefficiencies—we transform them into opportunities for unparalleled success. Leveraging extensive industry knowledge and cutting-edge tools like Mastercam and VERICUT, we elevate NC programs to achieve superior machining precision, embodying the new standard of CNC manufacturing. This white paper delves into the core challenges facing the industry, highlights the bespoke solutions AIM offers, and illustrates why collaborating with us is a strategic move for manufacturers who are committed to innovation and excellence.





At the forefront of CNC machining, AIM (Advanced Innovative Manufacturing) offers specialized services that are not only designed to optimize manufacturing processes but also to drive innovation and enhance productivity. Founded and led by Nico, a seasoned expert with unparalleled experience, AIM's primary objective is to empower precision and elevate technology. We take pride in providing deeply personalized services tailored to each client's unique challenges. Our mission is to equip our clients with cutting-edge tools and expert insights, ensuring they remain competitive in an ever-evolving market. Grounded in precision, technology, and a relentless pursuit of improvement, AIM has become a trusted partner for forward-thinking companies aiming to elevate their manufacturing capabilities.

OUR VISION

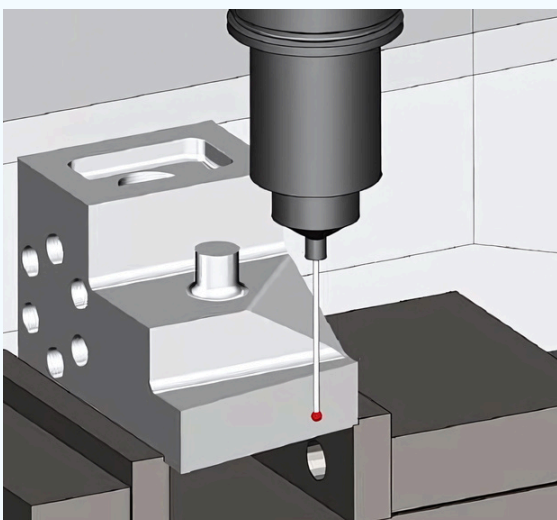
To be the industry leader in CNC machining solutions, driving excellence and innovation across all sectors.

OUR MISSION

To empower clients by optimizing manufacturing processes, leveraging the latest technology, and delivering tangible, measurable results.

OUR VALUES

Precision, innovation, and a relentless focus on customer success are the cornerstones of AIM.



In today's rapidly advancing manufacturing landscape, CNC machining is crucial to the future of industries like aerospace and medical devices. However, a major challenge remains: the underutilization of cutting tools caused by suboptimal NC (Numerical Control) programs. This inefficiency, often caused by a myriad of reasons, results in wasted time, money, and lost competitive advantage. Unfortunately, many manufacturers are still unaware of the severity of this issue, missing out on potential gains in profits and productivity.



OUR SERVICES

AIM delivers specialized services tailored to meet the complex demands of the CNC machining industry, leveraging unparalleled expertise in Mastercam. Each service is crafted to optimize NC programs, extend tool life, and elevate overall machining efficiency, all delivered with AIM's personal touch, stemming from deep industry knowledge.

NC PROGRAM OPTIMIZATION

AIM's consulting goes beyond the basics, providing deep process analysis and highly personalized recommendations. With years of experience in Mastercam, we take the time to fully understand your challenges and goals, offering solutions precisely tailored to your needs. Whether it's selecting the right tools, optimizing workflow, or integrating the latest technologies, AIM provides the expert guidance needed to keep you ahead in a competitive market.

TOOLPATH SIMULATION AND VERIFICATION

With a strong foundation in Mastercam and the added advantage of VERICUT, AIM offers comprehensive toolpath simulation and verification services. This ensures your machining processes are error-free and optimized for the best performance. By identifying potential collisions, inefficiencies, and other issues before they impact production, we help you save both time and money. Personalized feedback and tailored suggestions are provided to maximize operational efficiency.

ADVANCED MANUFACTURING CONSULTING

At the core of AIM's offerings is NC program optimization, where Mastercam expertise shines. We meticulously analyze your existing NC programs and process flow to identify inefficiencies and areas for improvement. Some of the goals are to maintain true constant chip thickness throughout the machining process, reduce tool wear and enhance cutting efficiency. With the optional use of VERICUT, we can further optimize and simulate processes, leading to superior quality parts and significant cost savings for your operations. Have old/legacy programs? Fear not, we can address those as well.



Expertise in Advanced NC Technologies

AIM's deep mastery of cutting-edge NC technologies, including industry-leading tools like Mastercam and VERICUT, ensures that every solution is precisely tailored to your business's unique challenges.

Customized Solutions

We focus on crafting solutions specifically designed to maximize the effectiveness of your operations, ensuring that you receive the full benefit of AIM's offerings.

Proven Track Record

With a history of delivering significant productivity gains and cost savings, AIM has established itself as a trusted partner in driving manufacturing excellence.

Focus on Continuous Improvement

AIM is committed to ongoing refinement, working closely with you to enhance and evolve your processes over time for sustained success.

Personalized, Client-Centric Approach

No matter the size of the project, we offer a level of personal attention that larger firms can't match. We take pride in investing the time to truly understand your needs and deliver impactful solutions.

Distinction in a Crowded Market

AIM stands out through a unique blend of deep industry expertise, advanced technology, and a relentless commitment to personalized service.

WHY CHOOSE AIM?



HOW WE WORK

At AIM, the key to successful manufacturing lies in a holistic and personalized approach to CNC machining. The process begins with an in-depth analysis of your current operations, pinpointing areas for improvement and uncovering inefficiencies that may be costing you time and money. By leveraging expertise in advanced NC technologies, we tailor solutions that enhance your workflow, optimize your NC programs, and ultimately boost your productivity and profitability.

1

Initial Consultation and Assessment

We begin by thoroughly understanding your specific needs and challenges. This involves a detailed assessment of your current NC programs, machining processes, and tool usage to pinpoint areas for optimization.

2

Simulation and Analysis

Utilizing our expertise in Mastercam, we simulate your machining operations to uncover inefficiencies, potential errors, and areas for improvement. We also offer the option to enhance this process with VERICUT, ensuring your NC programs are fully optimized and error-free.

3

Optimization and Implementation

Based on the insights from our simulations, we optimize your NC programs to ensure consistent chip thickness, reduce tool wear, and boost machining efficiency. We then work with you to seamlessly integrate these improvements into your operations.

4

Monitoring and Continuous Improvement

Optimization doesn't stop at implementation. We continue to monitor your operations and stay in close communication to identify new opportunities for improvement. Our commitment to continuous enhancement keeps your machining processes at the cutting edge of technology.

5

Training and Support

To fully leverage the benefits of our solutions, we offer comprehensive training and ongoing support. Whether you need to master new Mastercam features or integrate VERICUT into your workflow, we're here to ensure your team is fully equipped for success.

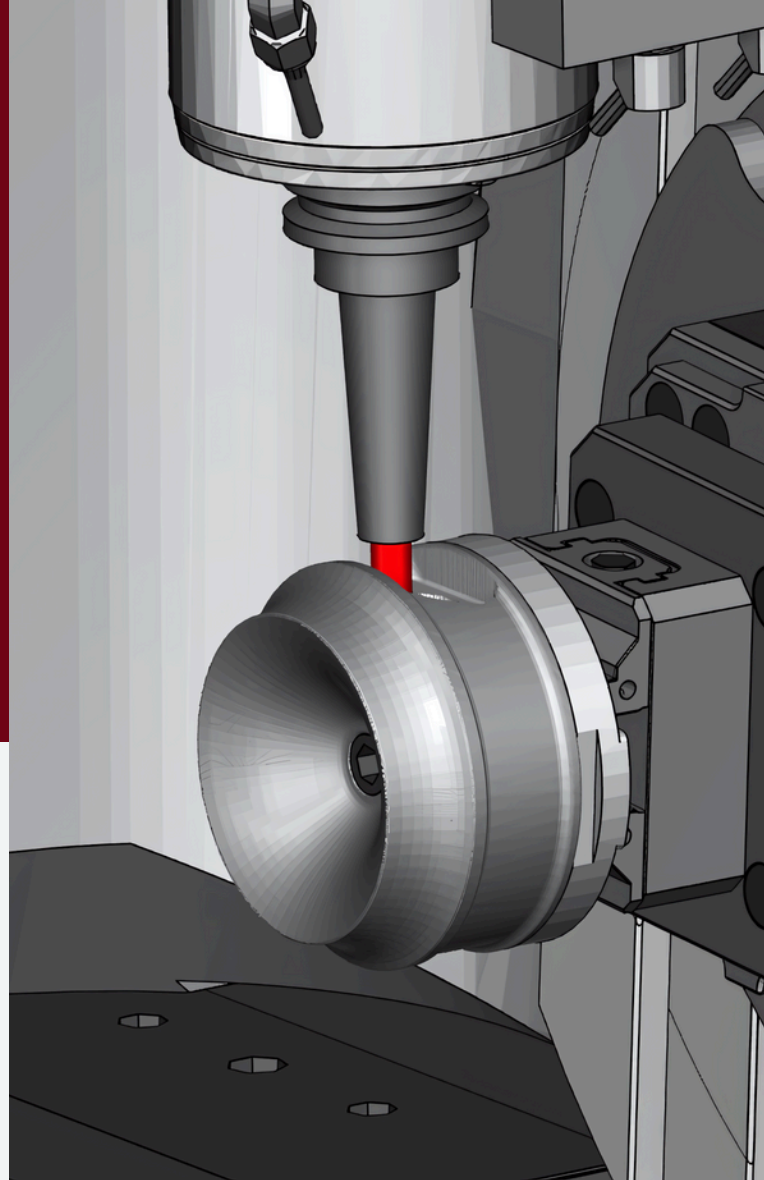


VERICUT

Why Vericut?

VERICUT CNC simulation software reads your actual posted NC program, catching critical mistakes that traditional CAM simulations often miss. Paired with the industry's most accurate cut stock model, VERICUT allows you to virtually machine parts, pinpoint errors, and optimize processes before any real cutting begins. Avoid costly damages, protect your tools, and make your NC programs faster and more efficient.

VERICUT simulates from the actual posted NC program, which catches mistakes you cannot find in CAM simulations!



CAD/CAM, Tooling, & Model Interfaces



Verification

- Multi Axis
- Additive
- Machine Simulation
- CNC Machine Probing
- Force
- Opti Path
- AUTO DIFF
- Grinder Dressing

VERICUT Drilling & Fastening (VDAF)

- VDAF Simulation
- VDAF Programming

Programming

VCP

Simulation

VCS

(Composite Applications)





VERICUT VERIFICATION

Detect program mistakes and verify part accuracy efficiently with VERICUT's base module: Verification.

Verification

AIM's VERICUT solution reads post-processed G-code as your machine tool does, detecting errors before they cause damage.

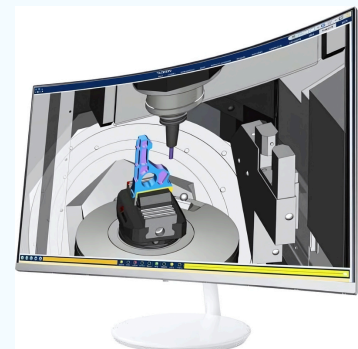


- Accurate NC program error detection: Identify issues before they impact production.
- Prevent collisions and broken tools: Avoid costly accidents and equipment damage.
- CNC control emulation and G-code support: Emulate machine control for thorough verification.
- Superior accuracy: More precise than STL/Polycut technologies.
- Measure cut part geometry: Validate part dimensions with precision.
- Supports multi-axis machines: Comprehensive support for advanced setups.

VERICUT Reviewer

With the VERICUT Reviewer, shop floor personnel, suppliers, customers, and other production engineers can access animations of the simulated CNC machining process from any computer—no license required.

- View CNC machine simulations from any computer: Easily share and review simulations across your team.
- Package reports for virtual workshop documentation: Create detailed reports for comprehensive virtual workshops.

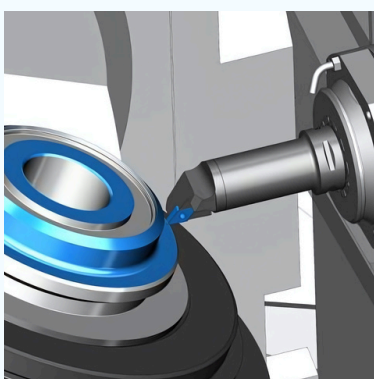


“VERICUT paid for itself the first time we used it.”

Dave Watson, Manufacturing Eng, Lockheed Martin Aeronautical Systems



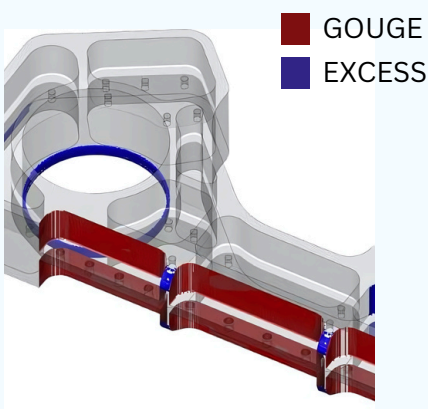
MULTI-AXIS & AUTO-DIFF



Verification

AIM utilizes VERICUT to ensure precise verification and simulation of material removal on multi-axis machines. As machining complexity increases, so does the risk of errors. With our services, you can trust that the accuracy of your NC programs, the quality of your parts, and the safety of your operators are all thoroughly validated.

- Accurately verify and simulate complex machining: Leveraging Mastercam and VERICUT to ensure precision in multi-axis operations.
- Essential for 4 and 5-axis machining: Crucial for managing advanced multi-axis setups with confidence



AUTO - DIFF

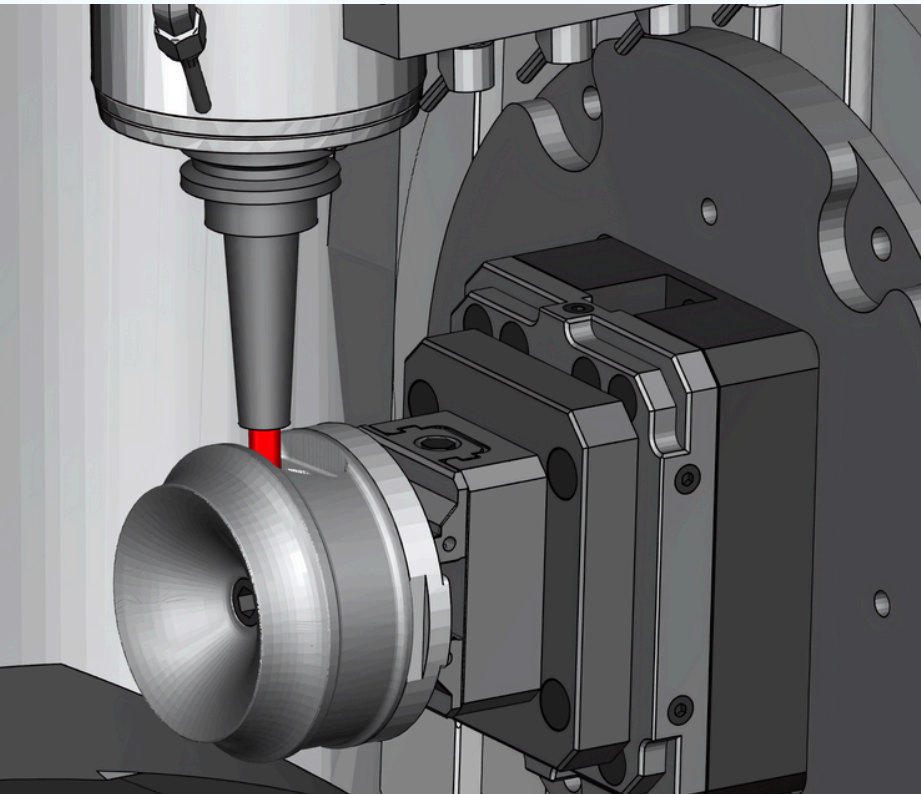
Using VERICUT's AUTO-DIFF module, AIM compares the design model to the "as-machined" model to detect gouges and excess material. This ensures that your tool path faithfully represents the intended design before production begins.

- Detect gouges and excess material: Identify discrepancies between the intended and actual machined parts.
- Compare cut model to CAD model: Confirm that the machined part aligns with design specifications.
- Identify overcuts and undercuts: Detect and correct deviations to ensure design accuracy.



MACHINE SIMULATION

Replicate the exact behavior of your CNC machines as they operate on the shop floor to identify errors and potential issues before they impact production.



DO YOU KNOW HOW MUCH PROVE-OUTS ARE COSTING YOU?

In today's competitive manufacturing landscape, effective software verification is crucial for delivering high-quality products on time and within budget. For instance, if prove-outs alone cost \$24,000 a month, this figure doesn't account for additional expenses such as scrapped or damaged parts, broken tooling, damaged fixtures, and increased machine maintenance. Consider the full cost of prove-outs in your operation—what could these additional expenses be adding to your bottom line?

*x 12 Machines
x 10 Hours per day
x 20 Days per month
x 10 % of time proving programs
= 240 hours spent x \$100 Hourly Machine Cost

= \$24,000 Monthly
OR \$288,000 annually*

A machine crash can not only damage your equipment but also disrupt your entire production schedule. With VERICUT, you can significantly minimize the risk of errors and avoid the costly process of proving out new programs directly on the machine. Our machine simulation detects collisions and near-misses across all tool components, providing a comprehensive safety net.

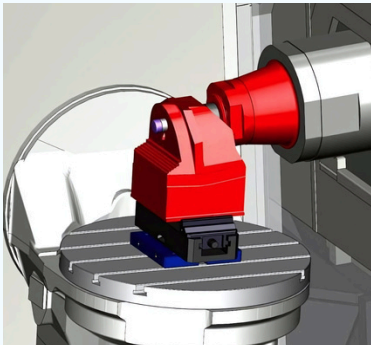
- Prevent CNC machine collisions and near-misses: Reduce the risk of accidents by identifying potential issues before they occur.
- Visualize the full machining environment: Gain a complete view of your machining setup and processes.
- Assess CNC machine capabilities: Streamline the implementation of new machines and reduce setup time.
- Prepare machinists for new programs: Offer a clear preview of what to expect, improving readiness and reducing surprises.
- Improve process efficiency: Optimize workflows and eliminate inefficiencies.
- Enhance shop safety: Increase overall safety by detecting potential hazards in advance.
- Elevate presentations and documentation: Use AVI simulations to create impactful visual presentations.
- Train without production downtime: Conduct training and testing without affecting production time or risking crashes.

“Before VERICUT, we were having difficulty getting first-time programs through the shop. Now we’re quickly approaching our goal of an 80% perfect part ratio on all first-time programs”
– Creg Crones, Programming Dept. Mgr, ProCam Machine



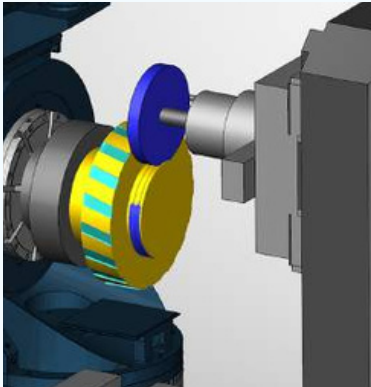
COLLISION CHECKING & GRINDER-DRESSING

Superior Collision Checking

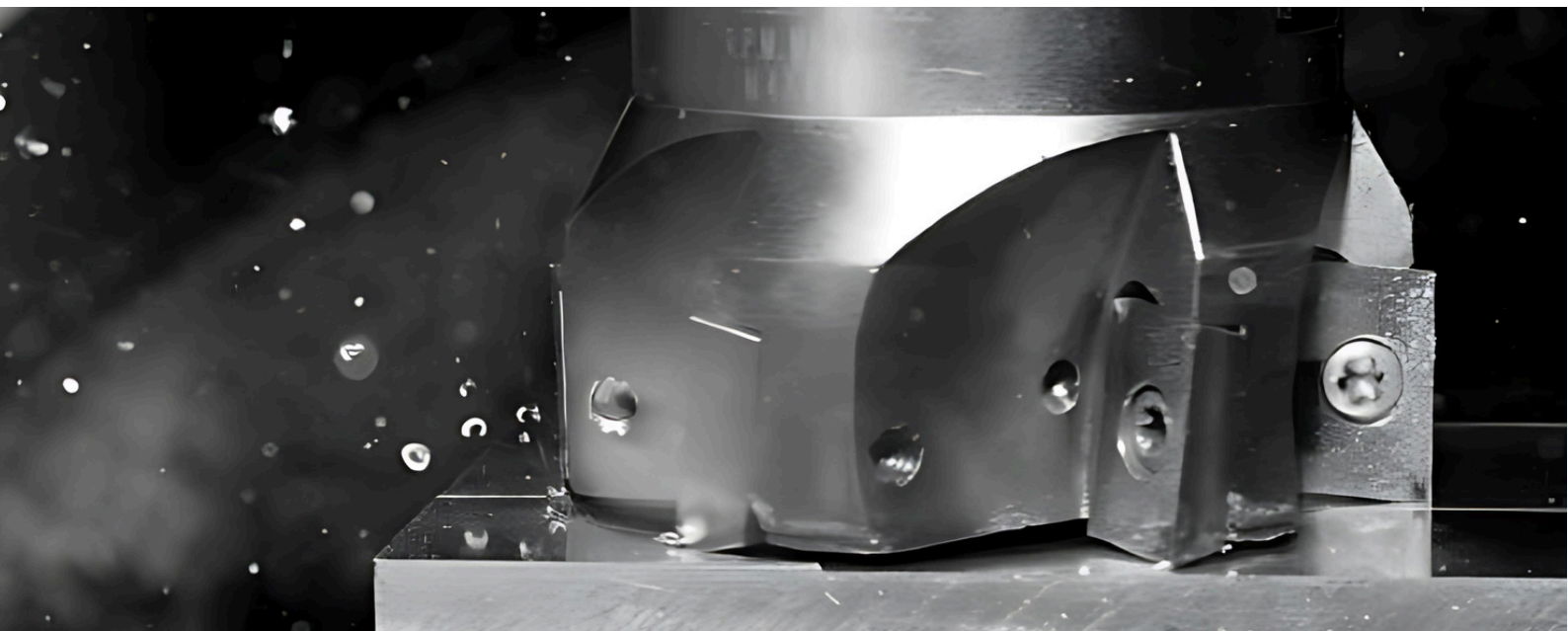


At AIM, we utilize VERICUT's advanced collision checking to provide unparalleled precision in your machining processes. Unlike basic systems that only check discrete points along a path, our approach sweeps through the entire travel path to ensure comprehensive collision detection. Designed by experts in NC simulation and verification, VERICUT is ideal for handling multi-axis machines, complex NC codes, and advanced programming techniques.

Grinder-Dressing



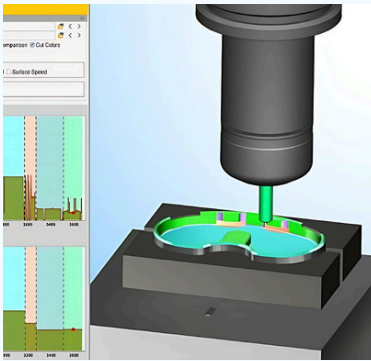
The Grinder-Dressing module enhances grinding operations with precise G-Code simulation for a dressed grinding wheel. As the wheel size decreases, the risk of collisions between machine components and the workpiece increases. VERICUT's module meticulously checks the clearance between machine components and the part, preventing collisions and ensuring accurate grinding. This capability supports all 5-axis milling and turning processes, accommodating even the most complex machining operations.





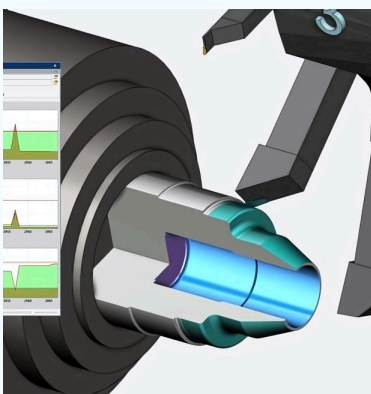
NC PROGRAM OPTIMIZATION

ALL NC programs, old or new, can be optimized with Force to run as efficiently and safely as possible



Force

At AIM, we leverage VERICUT Force to provide in-depth insights into your machining processes. This module allows us to visualize each cut in the NC program as the tool interacts with the material, revealing critical cutting conditions such as underutilized settings, excessive forces, metal removal rates, power, torque, and tool deflections. We can review and analyze your NC program through VERICUT's graphic review window, enabling us to fine-tune and optimize performance before running the program on your actual machine, ensuring both accuracy and efficiency from the outset. Have old/legacy programs that don't have CAM source files anymore? Fear not, we can build a Vericut file and still apply all of the benefits, including force optimization.



Analyze

Using VERICUT Force, AIM enhances NC programs across various materials, cutting tools, and machining conditions, resulting in substantial improvements:

- Reduce machining time by 15-25% or more: We minimize machining time without compromising on quality.
- Optimize any CAM or manually generated tool path: We refine tool paths, whether CAM-generated or manual, for optimal performance.
- Increase cutter life and improve surface finish: Our optimizations extend tool life and improve surface finish, ensuring superior part quality.
- Maximize productivity and savings: We tailor our approach to boost productivity and reduce costs effectively.
- Applicable to any tool and material: We utilize VERICUT Force to optimize any tool and material combination.

"Before VERICUT, we were having difficulty getting first-time programs through the shop. Now we're quickly approaching our goal of an 80% perfect part ratio on all first-time programs."

– Creg Crones, Programming Dept. Mgr., ProCam Machine



CNC MACHINE CONNECT & REPORTS

CNC Machine Connect

VERICUT's CNC Machine Connect module enables high-accuracy digital twins by establishing a live connection with the CNC machines on your shop floor. By integrating with Scytec's DataXchange software, you can compare real-time machine data with simulation values to identify any discrepancies.



Shop Floor Documentation

With VERICUT Reports, you can create and document inspection and setup procedures in a streamlined and formal manner.

- Customize reports using intuitive templates
- Include dimensions and notes in your reports
- Export reports in PDF or HTML formats

VERICUT Reports

Programmer Name: 6:02:21 PM

Part Number	Stock Material	Setup	Machine
ABC123	Titanium+6Al+V-HRC37	2	Makino_D200Z

INSPECTION REPORT

Identifier	Feature	Dimension	Maximum Tolerance	Minimum Tolerance	Instrument	Measurement
1	Distance	0.98	0.005	-0.005	Caliper	
2	DiameterRadius	0.76	0.003	-0.003	Comparator	
3	DiameterRadius	0.04	0.002	-0.002	Hole Gage	
4	Distance	1.82	0.005	-0.005	Caliper	
5	Distance	0.64	0.005	-0.005	Caliper	
6	Distance	0.64	0.005	-0.005	Caliper	
7	Distance	0.79	0.005	-0.005	Caliper	
8	DiameterRadius	0.04	0.002	-0.002	Hole Gage	
9	Distance	0.43	0.005	-0.005	Depth Gage	

“I have about a 98% chance that the first part off the machine is a good part! VERICUT has saved us thousands of dollars and will continue to save us money.”

– Charles Huffman, NC Programmer, Gibbs Machine & Tool

“I used Force on a program that I’d already optimized with a popular CAM system and Force lopped off (an additional) 40% of cycle time on the first go.”

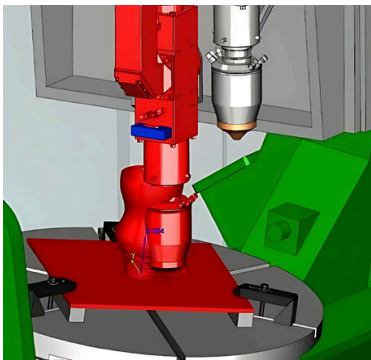
– John Giraldo, Aerospace Engineer, Sandvik Coromant



ADDITIVE MANUFACTURING

VERICUT's Additive module integrates both additive and traditional machining processes within new hybrid CNC machines.

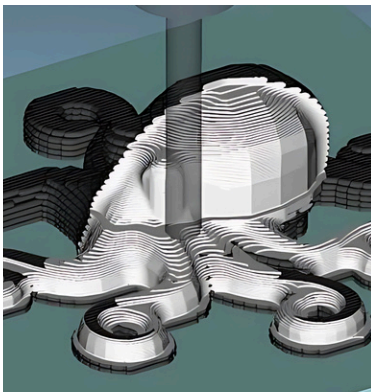
Verify Laser Activity & Detect Collisions



VERICUT's Additive module provides comprehensive machine simulation for precise laser cladding and material deposition. It detects collisions between the machine and the additive part throughout the building process, extending collision checking to include additive components as they are being constructed.

VERICUT ensures accuracy across all 5-axis milling, turning, and additive laser sintering processes, as well as other complex operations.

- Identify errors, voids, and misplaced material
- Simulate G-code programs for hybrid machines
- Detect collisions between the hybrid machine and additive parts
- Verify laser activity, power, material feed, and gas flow
- Visualize the realistic appearance of material deposition and machine features



Hybrid Manufacturing

In VERICUT, additive operations are combined in any order with traditional “subtractive” machining, such as milling, drilling, turning, etc. The realistic appearance of added material allows NC program- mers to tell that all necessary machining has been performed.

“We looked at all of the major manufacturing software providers for their simulation capabilities and VERICUT was the only one that met our needs out of the box.”

– Austin Kron, Managing Director, BeAM Machines



COMPOSITE APPLICATIONS

Programming & Simulation software for Automated Fiber-Placement (AFP) and Tape-Laying (ATL) machines.

VERICUT Composite Programming (VCP)

VERICUT Composite Programming (VCP) empowers composite part designers, mechanical engineers, and process engineers with the same advanced tools used by NC programmers to create Automated Fiber Placement (AFP) NC program paths. From design to production, VCP provides complete control over the process.

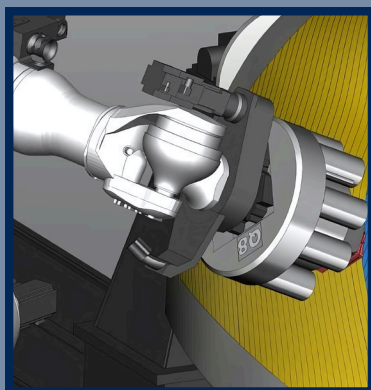
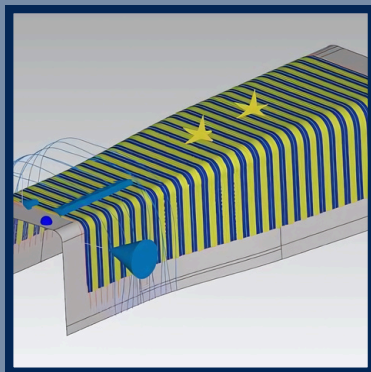
- Generate NC code for any machine vendor
- Explore and refine AFP path options
- Develop layup paths based on engineering specifications

VERICUT Composite Simulation (VCS)

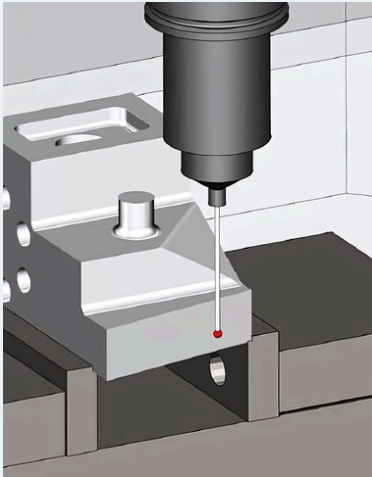
Programming and simulation software for Automated Fiber Placement (AFP) and Tape-Laying (ATL) machines.

AIM also offers VERICUT Composite Simulation (VCS), which simulates the application of composite material to the layup form using NC program instructions in a virtual environment. The simulation allows for measurement and inspection to ensure that the NC program adheres to manufacturing standards and requirements.

- Simulate composite layup machinery
- Ensure accurate operation of composite NC machines
- Detect collisions and errors



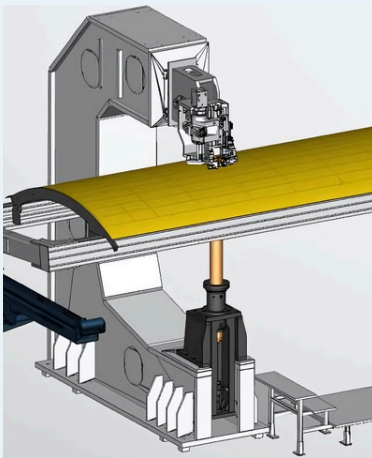
PROBING & DRILLING AND FASTENING



Probing

With VERICUT, probing operations become seamless and headache-free. The software alerts you if the probe tip contacts an object while not in 'probe mode' and detects potential collisions. Additionally, it verifies that the logic used during probing, which adjusts machine motion based on collected data, will not result in errors.

- Avoid probe collisions
- Simulate probing cycles
- Validate CNC probing processes



VERICUT Drilling and Fastening

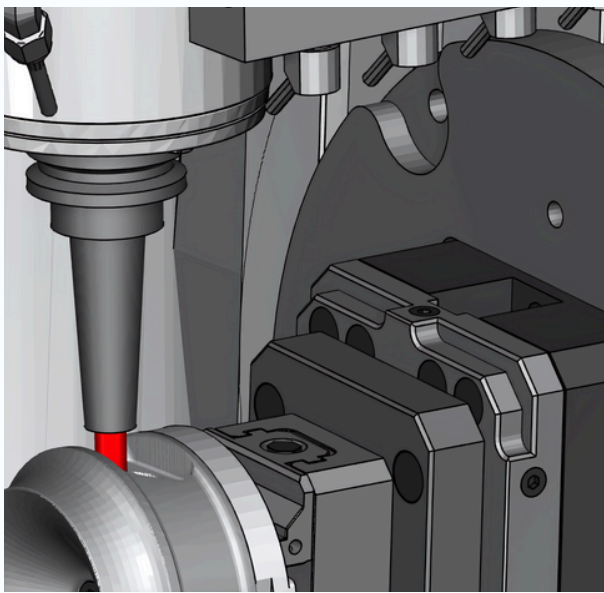
For drilling and fastening, AIM utilizes VERICUT Drilling and Fastening (VDAF), an independent software that programs and simulates auto-drilling and fastening machines. You can visualize and simulate drilling and fastening operations using the same NC program code intended for actual machine execution.

- Simulate machine motion directly from NC programs
- Prevent misplaced holes or fasteners and collisions
- Easily create NC programs with a user-friendly interface



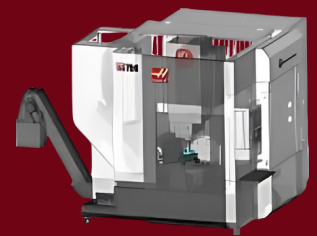
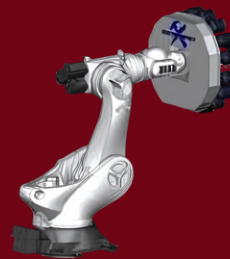
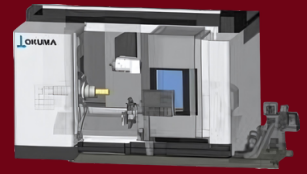
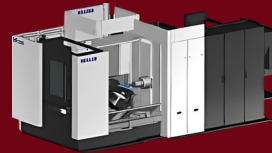


VERICUT MACHINE CONFIGURATION (VMC) & POST-PROCESSING



VERICUT Machine Configuration (VMC)

To ensure that your virtual machine replicates the behavior of your real machine precisely, AIM configures a Virtual Machine Configuration (VMC) to exactly match your machine tool, creating a true digital twin. AIM has developed and maintained an extensive collection of VMCs over the years, covering many leading Machine Tool Builders. These VMCs are often crafted using CAD data provided through partnerships with companies such as ICAM.



“We run new NC programs unmanned overnight - after they have been tested with VERICUT.”

– Paul Goresky, Senior Programmer, Tenneco Packaging, Inc.

Together, we'll push the boundaries of CNC machining excellence and set new benchmarks for your business.

Ready to elevate your CNC machining operations? AIM delivers the expertise, cutting-edge technology, and personalized support you need to optimize your processes and maximize profitability. With Nico's deep mastery of Mastercam and the strategic integration of VERICUT, we offer advanced solutions that drive tangible results, keeping you at the forefront of the industry.

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