



## What's NEW in VERICUT 6.0 – 6.0.5

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January 29, 2007

Dear VERICUT® User:

Thank you for your continued investment in VERICUT, an important part of your NC programming and machining process!

The VERICUT 6.0 NC simulation, verification, and optimization technology is packed with new features making it more powerful and easier to use. This letter describes important changes in VERICUT 6.0. Take a moment to review what's new and improved in this release.

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Sincerely,

Bill Hasenjaeger

CGTech Product Marketing

# VERICUT 6.0

## Release Notes

April 20, 2006

### **Please note the following:**

1. VERICUT 6.0 is not supported on Windows 98, Windows ME and Windows NT operating systems. Supported Windows platforms are Windows XP, Windows XP 64, and Windows 2000.
2. ATTENTION!: Customers using SGI/IRIX (any version), Sun/Solaris 8 or 9, or IBM/RS6000/AIX 4.4 or 5.0 for your VERICUT license server.

If you are serving licenses to Windows platforms from one of the platform/operating systems shown above, upgrading to VERICUT 6.0 requires you move the license server to a different platform type or operating system version. Valid license server platforms are: Windows, HP-UX (any version), Sun/Solaris 10, or IBM/RS6000/AIX 5.1 or later).

VERICUT 6.0 runs on SGI/IRIX, Sun/Solaris 8 or 9, or IBM/RS6000/AIX 4.4 or 5.0. But the license server on these platforms cannot provide licenses to VERICUT 6.0 on Windows.

Over 200 customer reported problems and 95 customer requested enhancements have been implemented in VERICUT 6.0. The following is a summary of enhancements.

## **VERICUT 6.0 Highlights**

### **Multiple Setups in a Single Session**

VERICUT 6.0 enables you to view, configure and simulate multiple setups in a single session. For each setup, you select the CNC machine/control configuration, attach the fixture and stock to the machine, and select cutting tools and NC programs. You are then ready to simulate the entire set of machining operations in a single VERICUT session. The configuration steps described above can be automatically configured from your CAD/CAM system using one of CGTech's CAD/CAM interfaces. Menus for day-to-day project setup are clearly separated from machine configuration menus, making it easier to setup daily simulation projects.

### **Simulate Machines with Multiple Synchronized Tools, Spindles and Auxiliary Attachments**

VERICUT 6.0 offers the capability to synchronize up to 32 machine "channels" or machines with multiple CNC controls. VERICUT's virtual machine is organized into multiple sub-systems that can be

synchronized \ together. Three simultaneous machining operations on a Citizen machine with a Mitsubishi M32 control? Nakamura machines with Fanuc controls and four complex simultaneous operations? VERICUT will simulate it.

### **New Tool Manager Speeds Optimization**

VERICUT's NC program optimization module—OptiPath®—is easier to implement thanks to a redesigned Tool Manager. OptiPath cutting data is now stored inside the Tool Manager. Creating new tools has also been improved by keeping the Add/Modify panel open when creating multiple tool assemblies. If a tool has already been created in another library, you can reference or copy the complete tool assembly, or individual cutter or holder components. A new search feature is implemented to simplify finding existing tools in both single and multiple tool libraries.

### **Model Export Enhancements**

VERICUT's Model Export option is enhanced in version 6 to enable export of native CATIA V5, ACIS, SAT, and STEP models, via add-on CAD model interfaces. Model Export creates CAD models from the VERICUT 'in-process' cut model generated by simulating an NC program. In VERICUT 6.0, Model Export outputs features where possible, or creates "synthetic features" when individual features are not possible or too small (such as "scallops" created by a ball end mill). Exported surfaces, faces, and features use NURBS trimming curves, resulting in smaller file sizes.

### **Create CNC Probe Programs & Inspection Sequences**

VERICUT enables you create probing routines using its 'in-process' model. Using VERICUT's simulated in-process feature geometry to create a CNC probe program makes on-machine in-process inspection a practical reality. In addition to CNC machine probe programming VERICUT 6.0's Verification license allows the creation of inspection instruction documents in HTML or PDF format for use by machine operators or quality control staff.

### **Other Enhancements**

1. Frequently used information and measurement panels can be "docked" within VERICUT's desktop
2. Automatically calculate minimum cutter and holder extension while simulating.
3. Graphs show information about cutting conditions for each NC block
4. Remove excess holding tabs using "delete material"
5. Milling tool shapes have virtually no restrictions on profile shape.
6. Constant Gouge Check has been updated to be much faster and simpler with improved display quality

## **New Modules**

### **Siemens 840D Virtual NC Kernel (VNCK)**

The Siemens 840D Virtual NC Kernel (VNCK) uses a separate 840D control emulation process to drive VERICUT's simulation. The control emulation process (a stand-alone program licensed from Siemens) uses the 840D control's core motion processing algorithms. The VNCK requires the actual 840D machine parameters (via a Siemens ARC archive file) when processing NC program (MPF) and subroutine (SPF) files. The VNCK controls NC program execution and sends control and machine status and axis motion to VERICUT. VERICUT uses the stream of VNCK data to simulate stock cutting, machine axis motions, and update various status information.

### **Model Interfaces**

Four new Model Interface modules enable VERICUT to both read and, when combined with Model Export, write the designated model file formats. These modules do not require a CAD/CAM system be available for VERICUT to read or write any of the formats.

#### **CATIA V5 Model Interface**

The CATIA V5 Model Interface reads CATIA V5 part files (.CATPart), up to R16. CATIA topological entities (such as CATBody, CATNurbsSurface, CATplane, etc.) are converted to triangular facets and written out as STL or VERICUT polygon files. Optionally a CATIA part file can be referenced directly in VERICUT's modeling interface, no intermediate file is written.

When used in conjunction with a new output option in the existing CATIA V5 to VERICUT Interface (CATV5), the CATIA V5 Model Interface is used to read .CATPart files directly referenced in the VERICUT project file written by CATV5.

When used in conjunction with Model Export, the CATIA V5 Model Interface writes a CATIA V5 model file. Depending on the features detected by Model Export, the CATIA file contains trimmed topological features (such as CATBody, CATNurbsSurface, CATplane, etc.).

#### **CATIA V4 Model Interface**

The CATIA V4 Model Interface reads CATIA V4 model files (.model), version 4.1.9 and 4.2.4. CATIA topological entities (such as SOLIDE, SKIN, VOLUME, FACE, surface, plane, etc.) are converted to triangular facets and written out as STL or VERICUT polygon files. Optionally a CATIA model file can be referenced directly in VERICUT's modeling interface. No intermediate file is written.

When used in conjunction with Model Export, the CATIA V4 Model Interface writes a CATIA V4 model file. Depending on the features detected by Model Export, the CATIA file contains trimmed topological features (such as VOLUME, polynomial surface, plane, etc.).

### **STEP Model Interface**

The STEP Model Interface reads STEP files (.stp or .step) containing AP203 and AP214 (geometry only) protocols. STEP topological entities (such as surface, solid, sheet, shell, face, etc.) are converted to triangular facets and written out as STL or VERICUT polygon files. The interface does not separate STEP assembly files into individual parts.

Optionally a STEP file can be referenced directly in VERICUT's modeling interface. No intermediate file is written.

When used in conjunction with Model Export, the STEP Model Interface writes a STEP file. Depending on the features detected by Model Export, the STEP file contains trimmed topological features (such as bspline surface, plane, conical surface, cylindrical surface, etc.).

### **ACIS Model Interface**

The ACIS Model Interface reads ACIS files (.sat), up to version R16. ACIS topological entities (such as bspline surface, solid body, sheet body, shell, face, etc.) are converted to triangular facets and written out as STL or VERICUT polygon files. Optionally an ACIS file can be referenced directly in VERICUT's modeling interface. No intermediate file is written.

When used in conjunction with Model Export, the ACIS Model Interface writes an ACIS file. Depending on the features detected by Model Export, the ACIS file contains trimmed topological features (such as bspline surface, plane, cone, etc.).

## **Product Enhancement Details**

### **VERICUT User Interface**

The VERICUT user interface has been completely reorganized for V6.0 including the Icon toolbar and Menu bar.

Most dialogs have been re-designed.

Menus used for day to day project configuration are separated from those used for machine and control configuration.

New "dockable" dialog windows enable you to personalize the VERICUT workspace to meet your specific needs and preferences. The following windows can be docked:

- Icon Toolbar
- Progress Bar
- Info > NC Program
- Info > Status
- Project Tree
- X-Caliper

## **Multiple Setup Project File**

A new Project File (.VcProject) replaces the User File of the past and enables you to simulate multiple operations in a single VERICUT session. XML syntax replaces the old user file syntax.

Each Project File can consist of one or more setups (operations). Each setup has its own:

- Machine and control
- Fixtures
- Tools
- NC Programs
- Simulation settings

The Cut Stock automatically moves from one setup to the next.

A new Project Tree provides a graphical representation of the Project File's content. Right-clicking on any item in the Project Tree, provides direct access to features and menus specific to the chosen item.

All work related to configuring and modifying a project can be accomplished right in the Project Tree.

## **AUTO-DIFF**

Constant Gouge Check is enhanced to provide the following advantages:

- Much faster than previous versions
- Much simpler to use than previous versions
- Completes in a single pass
- Produces more accurate results
- Uses less memory than previous versions
- The quality of the display is improved

Unexpected VERICUT termination no longer occurs when changing the visibility of the Design Points component before attempting to perform AUTO-DIFF point comparison .

## **OptiPath**

New feature "APT Output Options", added to the OptiPath Control window, enables specifying the number of decimal places output in OptiPath records created during optimization of APT files.

OptiPath is enhanced to prompt you to replace the current NC program files with the optimized files at the end of optimization.

New feature "Radius Control" is added to optionally control feedrate for circular motions based on the effective cutting radius rather than on the tool centerline.

Status window, Log file and VERICUT reports now correctly display calculated OptiPath times.

A problem causing a G1 to be suppressed, under certain conditions, in the optimized file is fixed.

A problem causing Air Cut Feed Rate to be output while in material, under certain conditions, in the optimized file is fixed.

Ramping Feedrate is now correctly output when using a concave cutter.

Sequence numbers are now output correctly when using re-sequence with library Fad88 control.

OptiPath now outputs correct feedrate when using FeedPerMinuteType ORV=2.

OptiPath output is now correct for conditions where CDC is used in a subprogram.

OptiPath and material removal are enhanced to detect and more effectively process very long, shallow, 3-axis cuts.

A problem causing optimized files to drop comment characters on some blocks is fixed.

## **Verification**

The Graphs feature is moved from the Status window to a separate Graphs window.

The Cutting Graph feature is enhanced to continuously update as each block is processed.

The Cutting Graph feature is enhanced to display critical information about any point on the graph by simply holding the cursor over the position.

VERICUT is enhanced to optionally check the current spindle direction against the cutting direction for the tool, and outputs an error if the directions do not match. Tool direction is specified in Tool Manager.

Original cut and stock colors are now preserved if the "Save With Features" option is used when saving a .vct file.

VERICUT now checks for invalid state of the tool and stock spindle while cutting. For example, if attempting a milling cut with the tool spindle off a collision is reported and an error is shown on the screen. The tool/cut stock collision is displayed in the error color and can be analyzed via X-Caliper using "Display Tool/Stock Collisions" mode.

New feature, "CSYS from File", enables the configuration of stock or part coordinate systems via APT CL matrix records in various CL formats from data contained in a file.

New feature "Import Setup" enables copying a setup from either a pre-V6.0 user file, or a V6.0 project file and appending it after the current setup.

New feature "CNC Machine" enables selecting the Machine and Control to be used for the current setup from a single dialogue panel, with choice lists of available machines and controls.

New "VERICUT Output Files" window enables you to setup, create, or view all of VERICUT's output files from one place.

Tool/stock collision detection logic is enhanced for more consistent results.

Enhanced holder collision detection logic works consistently for all tool types.

New "Cut Colors" feature enables specifying cut color by: Color Table, Tool Color, Feedrate, or NC program file.

Accelerated (Open GL) hardware display option is added to the workpiece view and used during dynamic rotate/pan/zoom.

False "Fast feed rate removed material" messages output when retracting from a bore are eliminated.

VERICUT is enhanced to reduce the time required to load or reset files.

A specific problem related to opening an old user file causing an unexpected VERICUT termination, is fixed.

Rotation Center symbol now displays correctly when selecting the rotary table axis in an OpenGL view.

A problem that enabled VERICUT to write over a Read Only file is corrected.

A problem causing a tool insert to move away from the holder, when processing a S4000M04 command with a 180 degree B-axis rotation, is fixed.

A problem resulting in incorrect AUTO-DIFF results after using Delete Material is fixed.

Total Time value is now consistent with the sum of individual tool use times.

A problem causing "phantom (non-existing)" material to be displayed on the part when using a concave cutter is fixed.

A problem causing the VERICUT session to "hang" when it encounters an undefined array variable is fixed.

Direction arrows now display correctly when selecting points (like when selecting a point to define a new CSYS, for example) in an Accelerated machine view.

A problem causing Curve Fitting to generate bad motions, and cause the unexpected termination of VERICUT is fixed.

VERICUT now correctly detects "Fast feed rate errors" for multiple active tools.

A problem causing unexpected VERICUT termination when using a specific cutter profile description is fixed.

The first tool is no longer forced to be the active tool when cutting circles in the MultiTool mode.

JPEGs are now output correctly when Grayscale method is used.

An error is now detected for a rapid motion through material, for situations where stock models are added after cutting has started.

The number of coordinate systems that can be displayed is increased from 64 to 512.

Tool ID is now correctly displayed in the Status window for multi-subsystem jobs.

Using Reset in the Select/Store window now correctly restores all views.

Unexpected VERICUT termination no longer occurs when creating a VERICUT report with "Initialize Machine/Control between NC Programs" toggled off.

A condition causing the VERICUT session to either "hang" or "terminate" when using a particular closed sweep solid model is fixed.

A problem causing some turning tools to display incorrectly in a profile view is corrected.

Tool holder graphics are now updated correctly when a cutter is extended because "Calculate Min.Cutter Extension" is active.

"Calculate Min. Cutter Extension" now works correctly for cutters where height is equal to the corner radius.

A condition causing VERICUT reports to incorrectly output 0 as a Time value is corrected.

Status window fields now display correct data during VERICUT image file replay.

A problem causing VERICUT to save duplicate snapshots for tool changes is fixed.

The VERICUT main window no longer pops in front of VERICUT Player window during image replay.

The VERICUT Log file is now cleared when a Project file is loaded.

PDF Inspection Reports now display correctly for multiple views.

A warning message is now output when circular mode is used without IJK parameters.

Inspection reports now display the correct page number sequence.

Cutting Conditions Graph processing is enhanced to eliminate unexpected VERICUT termination when processing very large numbers of records.

Unit conversion for VERICUT Solid files (.vct) saved with Features is implemented.

In the AutoSave menu, the automatic numeric append feature now works correctly for the "End of Each File" option.

VERICUT Reports now correctly outputs Time and OptiPath Time per tool when Tool Change By: File Name is active.

The Machine Offsets window is enhanced to display Rotation Plane Matrix values.

Matrix tab values are now appropriately updated when a project file is loaded.

NC Program Review now correctly synchronizes error, program record, and graphic display for situations involving main and sub-programs.

A sync problem with INDEX G300 causing an extremely long processing time for a simple block on the lower turret is fixed.

Collision detection is enhanced and no longer is affected by Animation Speed.

Material removal is corrected for turning with groove inserts when values for Length and D are equal

Unexpected VERICUT termination no longer occurs with repeated double-clicking with the mouse in the MDI window.

A warning is now output when changing the visibility of the stock component in the component tree, just like when visibility is changed in the Component Attributes window.

Stock and Fixture are now visible in the Workpiece view by default when creating a new project file.

ShadeCopy images created for a Machine view in OpenGL mode are now the correct color.

VERICUT is enhanced to output error messages if specified cutting limits (Max Cut Feedrate, Max Cut Depth, etc.) are exceeded. Limits are stored in Tool Manager with each tool's OptiPath cutting data. An OptiPath license is not required.

## **Machine Simulation**

VERICUT is enhanced to enable cutting and pasting words, address, and macros, from one machine to another, between setups.

Collision messages are enhanced to include specific holder names.

The Siemens Sinumerik 840D control is enhanced to enable generic support of Siemen's 840D MCALL command.

Tool/stock collision checking is enhanced and a new method of holder/stock collision checking is implemented to improved collision reporting capabilities.

Turret Rotations Table can be saved either in the machine file or in the project file's setup.

The V6.0 Project File stores coordinate systems (CSYSs) per setup. Imported setups maintain the CSYSs from the setup being imported.

VERICUT is enhanced to enable syncing of more than two sub-systems (up to 32). In addition, a new Sync graphical interface is implemented.

Boring Bar material removal logic is enhanced to enable accurate material removal for any motion type valid for milling tools.

New macros are added to enable checking that the commands which apply Tool Length and Cutter Radius Compensation match the tool number that is currently being used.

Storing of the collision detection list is split between the Project File and the Machine File, depending on the components being checked.

A new macro is added to access the current date.

Programmed RPM is now included in ActiveSpindleMinSpeed / ActiveSpindleMaxSpeed error messages.

Support is added for specification of return level (M52 and G71) in all planes for OSP5000M and OSP7000M controls.

Support is added for G68.2 in Fanuc controls.

Support is added for G68 in Fanuc controls.

Support is added for the ER command in Num1060m controls.

Support is added for the word EXTERN in Siemens 840D controls.

A problem causing G71 boring cycles to drive the wrong side of a defined profile, under certain conditions, is resolved.

Processing of a Sin840D REPEAT command is enhanced to not require the P word, and to ignore anything on the block that follows it.

A Siemens MCALL command no longer stops processing when a subroutine is called.

The WorkingPlane2Abc macro now processes correctly when used with a Fanuc G68.2 Offset.

Enhancements are added to enable G90/G91 (Absolute Dimension/Incremental Dimension) mode change to occur on the same block.

A problem resulting in a Tool colliding with the Stock/Fixture during a tool change, for the specific condition where the machine has 4 tool components (2 on either side of the stock) and the B axis is not at 0 when the tool change is called, is fixed.

A problem causing the part to be gouged on the first motion after repositioning the cut stock using MoveCutStockFromCsys / MoveCutStockToCsys is corrected.

Unexpected VERICUT termination no longer occurs using RTCP with RTCP PIVOT OFFSET type, and cutting with a completely concave bottom cutter shape in FastMill mode.

A problem causing VERICUT to hang when encountering an undefined word is fixed.

Two specific problems causing incorrect material removal during a cutter grinding simulation are fixed.

Unexpected VERICUT termination no longer occurs for a very specific sequence of events during NC program editing.

Master G&L controls are updated to use the new ChangeWorkCoordZWTracking macro to support using G92W/G92Z with Zero Tracking.

A problem causing a turning tool insert defined in the YZ plane to not cut after rotating to the XZ plane is fixed.

A warning is now output when a word-value missing from Word Address is used in an NC program.

A problem causing VERICUT to not stop on the block that calls a Control Subroutine is fixed.

A problem causing incorrect rotation plane calculations with CYCL DEF 19.1 using a WorkingPlane2Abc macro when a C axis offset is in effect is fixed.

An error message is now output during initialization if a Tool Chain component precedes the Tool component(s).

The software is enhanced to detect, during the scan pass, when there is a WHILE loop mismatch and output an error message. Checks are also added to prevent later mismatches from overwriting a previous loop.

The master sin840D control is enhanced to ignore all offsets, but not cancel them, when a G53 is encountered.

A problem causing fast feed errors to be reported for the wrong turret on a multi-turret lathe is corrected.

A problem preventing axes from displaying in an OpenGL view is fixed.

Support is enhanced for Cycle97 Threading cycles for conditions when the insert intersects the centerline (spindle Z-axis).

VERICUT is enhanced to better handle the modal nature of the G32/G33 blocks when used with CycleTurnThread.

The sin840d library control is enhanced to support WHILE, DO and ENDWHILE commands.

## **Model Export**

New "Features and Patches" method replaces "Grid".

- Outputs features (cylinder, torus, etc.) where possible.
- Creates "patch" features when not possible (or desirable), such as scalloped areas.
- Combines "too small" features into patches

New "Preview and Combine" feature enables you to interactively combine, or split, patches and features to produce the desired results.

Model Export is enhanced to produce smoother edges and surfaces, resulting in better looking parts.

All trimming curves are NURBS, resulting in smaller files.

When used with the new Model Interface modules, Model Export outputs CATIA V5, CATIA V4, ACIS SAT, and STEP models.

## **OptiPath**

OptiPath no longer outputs excessive feedrates, for circular cuts that do not remove material but are in contact with the material, when in FastMill mode.

## **Tool Manager**

The Tool Manager desktop and the Add/Modify panel are both active for easier tool creation.

Multiple gage points, driven points and cutter compensation values can be added to each tool.

A comprehensive Search Tool panel, for finding and using existing tools or tool components, is added.

A Mill Tool assembly "wizard" is added enable you to create a new milling tool in one simple panel by answering a few questions. Enables creating multiple insert cutters by specifying the number of inserts without having to copy and position each insert.

OptiPath records are created and stored in the Tool Manager.

A comprehensive Search OptiPath record panel, for finding and using existing OptiPath records, is added.

Milling tool shape restrictions are removed to support form tools typically used in production machining. The only remaining restriction is that the tool profile cannot cross itself.

Standalone Tool Manager is enhanced to support 128 colors.

Tool manager is enhanced to enable using VRML model files for tool holders.

Tool Manager is enhanced to enable "referencing" complete tool assemblies, in addition to individual tool components.

Support is added for multiple turning tools in one holder.

Support is added for Multi-Z direction tool profiles.

Support is added for tools with a profile that switches in the X direction more than one time.

Support is added for concave profile tools.

Tool Manager is enhanced to store cutting limit values (Max Cut Feedrate, Max Cut Depth, etc.) in OptiPath records for each tool.

Tool Manager is enhanced to enable storing the appropriate spindle direction for each tool.

Problem causing Tools report to contain blank JPG images when tools are created via scanning APT tool path is fixed.

Tool manager, and VERICUT, are enhanced to allow tool definitions where the flute length is less than or equal to the corner radius. This applies to APT, Bull, or Ball tool definitions.

STL holder now displays in the Workpiece view when using an APT source toolpath. However, orientation of the STL holder is set by the IJK tool path vector, which is not enough information to orient an asymmetric model.

Importing a DXF file into Tool Manager, when there is an existing cutter description, no longer causes an error.

## **X-Caliper**

X-Caliper is enhanced with the following features:

- Choose the units (inch or millimeter) that you want measurements displayed in.
- Choose/change the X-Caliper "highlight" color.
- A measurement history is displayed in the X-Caliper window. This history can be printed, saved to a file or cleared at any time.
- Display, and measure, all tool holder/stock collisions. Then use the "Feature/History" option to obtain information about the collision (NC Program file, Record number, Tool ID, etc.)
- New "Highlight Same Planes" feature enables you to display all "cut" features, within a specified tolerance, that lie in the same plane.
- Distance/Angle is enhanced to enable using a CSYS Origin or CSYS Axis to define From / To features.
- Volume is enhanced to report both the total volume of the selected model and the volume of the selected contiguous piece of material if model consists of several disjoint pieces.

## **Inspection**

Inspection is enhanced to:

- enable displaying a customized list of inspection instruments stored in a file.

- enable defining inspection items "per view".
- refresh VERICUT calculated values if the cut stock changes.
- automatically update tolerances when dimensions change.
- notify you when changing the active coordinate system affects dimensions.
- Inspection graphics are enhanced:
  - the CSYS is displayed in the inspection report.
  - feature symbols are moved so they do not obscure the feature.
  - the end of an identifier leader line is highlighted.

Inspection Programming feature is added to enable you to quickly, and easily, create a G-Code program to drive an NC machine with a probe loaded to the critical inspection points associated with the current user file.

The Inspection Table is enhanced to include tool ID.

### **CNC Machine Probe module**

A new "Probe Programming" feature is added to enable creating CNC probe programs with VERICUT. This feature:

- uses VERICUT's cut stock.
- creates probe actions using VERICUT's cut features.
- outputs probe motion using VERICUT's post-processor.

The "Probe Programming" feature is most effective for in-process inspection. The Probe Programming process assumes that the NC program has produced a correct cut stock and probes VERICUT's simulated cut features.

### **CATIA V5-to-VERICUT Interface**

Enhanced to support CATIA V5 R16

The interface is enhanced to support VERICUT V6.0's multiple setup functionality.

The template user file and "addusr" are replaced by an "Operations file". The Operations file:

- contains a list of Project files and setups to use as templates.
- is automatically created by the interface.

The interface is enhanced to use coordinate systems to locate models on the machine for each setup.

The interface is enhanced to enable selecting products/parts from the CATIA tree, or graphically within CATIA.

A problem resulting in an error message when using Model Placement options with CATIA V5 R16 is resolved.

A problem causing some tools to transfer incorrectly via CATV5 when using CATIA V5 R14 is resolved.

### **MasterCAM-to-VERICUT Interface**

Enhanced to support MasterCAM X

The interface has been enhanced to support VERICUT V6.0's multiple setup functionality.

The template user file and "addusr" is replaced by an "Operations file". The Operations file:

- contains a list of Project files and setups to use as templates.
- is automatically created by the interface.

The interface is enhanced to use coordinate systems to locate models on the machine for each setup.

### **Unigraphics-to-VERICUT Interface**

Enhanced to support Unigraphics NX3

The interface has been enhanced to support VERICUT V6.0's multiple setup functionality.

The template user file and "addusr" is replaced by an "Operations file". The Operations file:

- contains a list of Project files and setups to use as templates.
- is automatically created by the interface.

The interface is enhanced to use coordinate systems to locate models on the machine for each setup.

All CSYS's are now transferred from UG to VERICUT. You can select a CSYS through which to transform models and a program zero CSYS is created, which you can override if desired.

A problem preventing VERICUT to start a second time during the same UGV session is fixed.

VERICUT now starts up with only a Workpiece view when using "Active WCS" for processing G-Code data.

UGV now passes the correct control point values for turning tools using button inserts.

UGV is enhanced to enable specify the Program Zero using a "From" component and a "To" CSYS.

### **Miscellaneous Enhancements**

New "Tab Removal" feature is added to Delete Material to enable easy removal of holding tabs (used for holding the part during the machining process) from a VERICUT cut model.

A new CAD Model Converter is added to enable converting (translating) CAD models in various formats (CATIA V4 R14, CATIA V5 R14, STEP, SAT) to Stereolithography (STL) or VERICUT Polygon model files.

VERICUT Report features and templates are enhanced. The following are just a few of the many improvements:

- Tool Summary Table template enables you to choose to output data "sequence by sequence", or to "group sequences using the same tool".
- Reports can be generated from a batch script and is added to Batch Wizard.
- Table creation features are enhanced to provide more data choices and flexibility.
- Design solid file name is added to the File Summary Table.

Dual monitor support of NVidia DUALVIEW mode is improved.

VERICUT is enhanced to support 128 shade colors.

VERICUT is enhanced to run as a 64 bit application on Windows XP64.

The following conditional checks are added to the Word Address when checking for variable values: <, >, =>, <=, =, and < >

New feature "Calculate Min Cutter Extension" automatically modifies tools if the cutter does not extend far enough out of the holder. A prompt will display giving you the option to save the modified tool library file.

Status window is enhanced to be both "dockable" and "scrollable".

New right mouse feature "Unselect All" in the NC Program window enables unselecting all program files selected with "Use Selected Files" active.

Check for correct spindle direction, based on turning tool orientation, is added.

Working Directory icon is added to the VERICUT Toolbar.

VERICUT solids for cut stock, X-Caliper, and rendering, are created as sweep models without using facet triangles.

New features are added to make Cutter Compensation easier to use.

New features, "Min. Motion Dist." and "Max Motion Dist.", are added to the Motion window enabling you to specify the range of the Animation Slider providing more control over animation speed.

A problem causing the IGES Converter to fail when transferring Entity 126 data from a CATIA V5 IGES file is resolved.

A problem causing the IGES Import function to output incorrect units under some conditions is corrected.

A problem causing Install Anywhere to report the same disk space requirement for Full install as for a License install is fixed.

A problem causing collisions to be detected with the Design component is corrected.

A problem causing incorrect material removal, for milling and turning, when using a Mazak 300 IISY with sub-spindle is fixed.

List-Numeric, and List-Alpha-Numeric, no longer require 2 arguments.

RPCP logic is enhanced to work with the "active" stock.

New logic for checking tool/cut stock collisions for invalid turning motions, not in the turning plane is added, eliminating invalid " insert profile is not in a turning plane, ... " error messages.

Relational offsets are enhanced to support machines with non-orthogonal axes, such as a slant bed lathe.

Unexpected VERICUT termination no longer occurs for situations where a long line (128 or more characters) contains a comment character with nothing after the comment character.

A problem causing the incorrect display of the Driven Point Axis when the view is attached to the Z component is fixed.

A problem causing Model Sketcher, DXF Import to build an incorrect model, under some conditions, is fixed.

A problem preventing the Surface to Solid Converter from working in a "batch" session is fixed.

VERICUT no longer outputs an error when it encounters the ' (apostrophe) character in APT statements output by UG.

Material Removal for Trepan/Cup type cutter plunge cut now displays correctly.

## **Training Sessions**

All training sessions are new for V6.0 and include separate sections for VERICUT and for Machine and Control Configuration.

Files for the training sessions are now stored in a separate TRAINING folder.

## **VERICUT Help**

VERICUT Online Help is completely re-organized for V6.0.

## New Macros

50 new macros have been added for V6.0.

<b>ActiveSpindleComponentName</b>	<b>LinkOffset</b>
<b>ActiveSpindleDir</b>	<b>MacroNotFoundMessageOnOff</b>
<b>ActiveSpindleMaxSpeed</b>	<b>Motion3DCircle</b>
<b>ActiveSpindleMinSpeed</b>	<b>OkumaCutDepth2</b>
<b>ActiveSpindleOnOff</b>	<b>OkumaCutDepth3</b>
<b>ActiveSpindleSpeed</b>	<b>OkumaStartCutDepth2</b>
<b>AxisPriorityOnOff</b>	<b>OkumaStartCutDepth3</b>
<b>CallSubCurrent</b>	<b>ResetIfCheck</b>
<b>CGTechVarDefMacro</b>	<b>ReturnFromSubCall</b>
<b>ChangeSubsystemID</b>	<b>RotationPlaneCancelReset</b>
<b>ChangeWorkCoordinateZWTracking</b>	<b>RotationPlaneEnable2</b>
<b>CircleDirectDrive</b>	<b>SetAxisCompLink</b>
<b>CircleIntermediatePoint</b>	<b>SetAxisRegisterName</b>
<b>CollisionDiagonalSize</b>	<b>SetVNCKOption</b>
<b>ConditionalEndOfBlock</b>	<b>SiemensPolarAngle</b>
<b>Enhanced5AxisLogicOnOff</b>	<b>SyncCode</b>
<b>FanucRotationPlaneLocal2</b>	<b>SyncId</b>
<b>GageOffsetAttributes</b>	<b>SyncMismatchHandling</b>
<b>GageOffsetDrivenPoint</b>	<b>ToolCutterComp</b>
<b>GageOffsetFirstDrivenPoint</b>	<b>ToolLengthCompValueDirect</b>
<b>Heid_CallLbl</b>	<b>TurretToolChangeAlpha</b>
<b>Heid_GotoLabel</b>	<b>Type2GotoLabelCond</b>
<b>HeidMPlus_SubroutineSequence</b>	<b>Type2IfBlock</b>
<b>LinkAxisId</b>	<b>UpdateModalMacroVar</b>
<b>LinkCompName</b>	<b>VarsUpdateMacroVars</b>
<b>LinkFormula</b>	

# VERICUT 6.0.1 Interim Release

## Release Notes

July 12, 2006

VERICUT Version 6.0.1 contains everything described above for V6.0, plus these additional fixes/enhancements.

### **AUTO-DIFF**

A NullPointerException error caused under certain conditions when using a CAD/CAM interface is fixed.

### **Verification**

A problem causing VERICUT to miss a holder/stock collision for a particular situation when using a milling tool on-center, while cutting in turning mode, is corrected.

Coordinate systems are now kept when importing a setup from a user file into a V60 project file.

A problem causing the cut stock display to disappear under certain conditions is fixed.

A problem causing the wrong tool to sometimes be loaded, after a tool change, is corrected.

A problem causing the line number displayed at the bottom of the Info/NC Program window to briefly display "Line 0" before displaying the next line number is fixed. The problem only occurred under a very specific situation.

The Tooling status color (magenta/black), in the Project Tree, is now updated correctly when a tool library is specified for a new setup.

Changing the Fast Feed value in the Motion window, with no NC programs specified, no longer results in a NullPointerException error.

Unexpected VERICUT termination no longer occurs upon reset, after manipulating the cut stock for a 2<sup>nd</sup> or subsequent setup on Windows 2000.

Unexpected VERICUT termination no longer occurs upon reset, after copying an existing setup, then immediately deleting it.

X-Caliper Distance/Angle now reports the correct distance between two parallel planes, with a non-orthogonal CSYS active.

Upward compatibility of VERICUT solid files (.vct) is enhanced. An automatic conversion is implemented to update the history data (Saved with Features) from 5.4 VCT files to 6.0's internal format. This conversion happens when the VERICUT Solid file is opened in 6.0 (either via Model Definition or by opening a VERICUT user or project file).

Auto Section is enhanced to output an error message to the logger if an invalid Cuts value is entered.

Start At: Line Number =1 now starts at line number 1 for all setups.

A problem resulting in incorrect material removal, for situations where a linear component placed between the tool and the spindle caused VERICUT to incorrectly interpret the configuration as a facing head tool, is corrected.

A problem causing incorrect circular interpolations, when using a Heidenhain control with Curve Fitting, is corrected.

A problem causing unexpected VERICUT termination due to a specific tool description is fixed.

## **Machine Simulation**

A new macro, WarningMacro, is added to enable user configuration of warning messages and conditions.

Support is added for Okuma OSP G84 LAP turn cycle change.

Support is added for Okuma OSP G85 Roughing and G87 Finish LAP turn cycles.

Support is added for bitwise AND, OR, and XOR (exclusive or).

A new macro, PlaySoundFile, is added to enable playing a wav file.

A problem causing unexpected VERICUT termination under certain conditions with collision detection, and the CollisionOnCutPart macro turned off, is fixed.

Unexpected VERICUT termination no longer occurs upon reset, when an array variable is beyond the defined range.

User Defined Tag values, entered through the NC program, are now applied correctly in the User Defined Tags window.

New machines built within an open Project are now added to the Machine list in the Project Tree, when the machine is saved.

Using the SetComponentColor macro, to change a component color, now produces the color specified.

## **OptiPath**

A problem causing OptiPath to not optimize the 2<sup>nd</sup> and subsequent NC programs in a setup, under certain conditions, is fixed.

A problem causing OptiPath to output incorrect "OptiPath Time" values is fixed.

## **Tool Manager**

A problem causing an inserted groove tool to display incorrectly in Tool Manager, under certain conditions, is fixed.

Pre-V6.0 Tool Library files now convert correctly, when brought into V6.0, for situations where the report file name contains invalid characters.

OptiPath Cutter shape is now passed correctly to OptiPath when starting a new Tool Manager file.

## **CATIA V5-to-VERICUT Interface**

The CATV5 main window is enhanced to have a larger default size.

A checkbox is added to allow appending setups to the specified project template.

The "OK", "Apply", and "Cancel" buttons are replaced by "Generate Files", "Run VERICUT", "Generate and run", and "Exit CATV".

Each Part Operation selected for simulation now outputs a separate tool library file, in order to allow different tools of the same name to be simulated in each setup in VERICUT.

## **MasterCAM-to-VERICUT Interface**

MCAMV is enhanced to enable specifying the Program Zero using "From" and "To" components.

## **Unigraphics-to-VERICUT Interface**

UGV is enhanced to enable selecting faceted models.

UGV is enhanced to enable users to save Default NC Program File Extension, and Simulate NC Program option settings in the Unigraphics Preferences file.

UGV is enhanced to enable tools from the current UG session to be merged into the tool library file specified in the setup template.

UGV is enhanced to support the UG NX3 CLS command CIRCLE/x,x,x,xx,x,x,x,x,x,TIMES,x. Helical motion is generated for "CIRCLE/7-values,TIMES,value" and "CIRCLE/11-values,TIMES,value".

A problem causing some turning tools to be created incorrectly has been fixed.

## **Miscellaneous Enhancements**

The Machine Offsets window is enhanced to maintain a minimum column width, enabling the column header to be read, regardless of the width of the values entered in the column.

Import DXF has been enhanced to enable specifying the tool control point either by Control at Tip (lowest Y position in the tool) or by Control at DXF (0,0)

Numerous additions and enhancements have been added to the Online Help.

## **New Macros**

**OkumaFeedrate2**

**OkumaFeedrate3**

**PlaySoundFile**

**SyncIds**

**WarningMacro**

## **New Macros/Functions that are not yet included in the documentation**

**SyncIds** - Causes the current head (also known as subsystem, program, system, or channel) to wait until the specified heads (specified as an index value; 1 to 9) reaches the corresponding Sync value. This macro is called with a list of Sync IDs for its numeric value. For example: 123 would sync heads 1, 2, and 3. Any Sync ID corresponding to itself would be ignored. The Sync value needs to be set prior to this call. This Sync value is set by calling the **SyncCode** macro.

**WarningMacro** - enables you to configure warning messages and conditions.

# VERICUT 6.0.2 Interim Release

## Release Notes

August 29, 2006

VERICUT Version 6.0.2 contains everything described above for V6.0.1, plus these additional fixes/enhancements.

### **AUTO-DIFF**

A problem causing AUTO-DIFF > Compare by Region > Fit to Memory to work incorrectly under specific conditions is fixed.

### **Verification**

A problem causing a multi-axis, APT toolpath, to incorrectly leave slight "cusps" on a pocket wall has been fixed.

A problem causing unexpected VERICUT termination while simulating under certain conditions is fixed.

Incorrect mate/align model assembly results using a planar surface cut with a specific inserted cutter is fixed.

Imported machine and control files are now correctly saved when exiting VERICUT.

Unexpected VERICUT termination no longer occurs for certain situations when a setup is imported after processing the previous one.

Unexpected VERICUT termination no longer occurs when using a .vct files saved "with features".

A problem causing VERICUT to lose track of subroutines in the second setup, when an IP file is created after running the first setup, is fixed.

When creating a new millimeter project file, APT NC Program Default Units, are now set correctly.

Tools now display correctly in a profile view, when more than 2 subsystems are present.

Multiple setup IP files now display correctly when opened.

Unexpected VERICUT termination no longer occurs, due to failure to release memory, when using a pre-V60 .vct model file in V60 VERICUT.

A problem causing VERICUT to generate fixture collision errors for hidden (not visible) fixture components is fixed.

VERICUT now handles multiple setup project files, having identical setup names, correctly.

A problem saving/loading .vct models created from sweep models is corrected.

VERICUT now correctly interprets the amount of memory available on Win /XP64 machines.

"Autosaved" IP files now load correctly.

Opening a pre-V60 user file in 6.0 with a Minimum Error Volume of zero, now defaults to the previous internal value used by 5.4 (0.5 cmm (0.0000031 cubic inch).

A problem causing incorrect material removal, under certain conditions, with the Animation Slider is set to 100 percent is fixed.

Unexpected VERICUT termination no longer occurs when IGES files are read in via model type "Model File".

## **Machine Simulation**

A new macro, **TurnOnOffMessage**, is added to enable turning off messages that are displayed in VERICUT. Currently, the only message that is supported is: "ZeroRadiusCircle: ignoring circle statement with zero radius". The capabilities of this macro will be expanded in V6.1.

A new function, **IntTruncAdj**, is added to enable automatically adjusting for computer roundoff errors.

## **OptiPath**

A problem causing OptiPath to overwrite a toolpath that is not being optimized is corrected.

A problem causing an optimized file to contain only feedrates is fixed.

OptiPath now correctly creates a tool library file, when optimizing an apt source file and using "learn" mode, is fixed.

## **Tool Manager**

New values entered for a new driven point now display correctly in the description field.

The holder search utility now works correctly when using mounted directories.

## **CATIA V5-to-VERICUT Interface**

A problem causing turning tools from pre-V60 tool libraries to be displayed as "mirrored" is corrected.

A problem causing VERICUT to prompt to open a project file when using CATV, with VERICUT Preference set to "Choose project file at startup", is fixed.

Multiple fixture models, defined as "instances" in CATIA now transfer correctly to VERICUT.

A problem causing the cut stock to be incorrectly positioned under certain conditions, when transitioned between setups, is fixed.

## **Unigraphics-to-VERICUT Interface**

The **Model Location** button now remembers the prior selection and the **Select / Reselect** buttons are sensitized and de-sensitized correctly.

## **Miscellaneous**

A problem causing an XP64 desktop shortcut to incorrectly point to the Windows XP (32 bit) installation is fixed.

## **New Macros**

**GangToolChange**

**SetMathOperatorPriority**

**TurnOnOffMessage**

## **New Macros/Functions that are not yet included in the documentation**

**GangToolChange** - When the Tool component with the corresponding **Tool Index** value is found in the NC machine configuration, this macro will call the following macros: **TurretRetract**, **TurretActivateTool**, **TurretLoadTool**. These macros are not called if the specified Tool component is already active, or the Tool component with the corresponding **Tool Index** value is not found. Typically the Tool component must match both the Tool Index, and the current subsystem. If a Text Override value of **TOOL\_INDEX\_ONLY** is passed, then the comparison will be made strictly on the Tool Index.

**NOTE:** This is almost identical to TurrentToolChange except the TurretIndex macro is not called, and the new **TOOL\_INDEX\_ONLY** feature has been added. When using **GangToolChange**, you do not need a TurretRotationTable. This macro should not be used for Turrets where a rotation is needed to index the turret into proper location.

**SetMathOperatorPriority** - This macro sets the priority for a specific math operator (or group of operators). This is used to control the order of precedence. Operators with lower priority numbers, will have the higher precedence, and will be executed first. For example: The default priority for "MULTIPLY" is 2, and for "ADD" is 3. The equation:

$$2 + 3 * 4$$

Is therefore evaluated as:

$$2 + (3 * 4)$$

The following are the default priorities for the operators: (NOTE: If Order of Math Operations is set to Left to Right, all priorities will be set to 5).

```
POWER = 1;
MULTIPLY = 2;
DIVIDE = 2;
MOD = 2;
ADD = 3;
SUBTRACT = 3;
EQ = 4;
NE = 4;
GT = 4;
GE = 4;
LT = 4;
LE = 4;
BITWISE_AND = 5;
BITWISE_XOR = 6;
BITWISE_OR = 7;
AND = 8;
OR = 9;
```

In addition to the above operators, the following groups are supported:

MATH (POWER, MULTIPLY, DIVIDE, MOD, ADD, SUBTRACT)

CONDITIONALS (EQ, NE, GT, GE, LT, LE)

LOGICALS (AND, OR, BITWISE\_AND, BITWISE\_OR, BITWISE\_XOR)

Example:

To use the standard rules of precedence except have all logical operators come before all the conditionals, make the following calls during the reset event:

SetMathOperatorPriority OV=4 OT=LOGICALS

SetMathOperatorPriority OV=5 OT=CONDITIONALS

**TurnOffMessage** - This macro gives the capability to turn off messages that are displayed within VERICUT. The text field specifies the native text tag of the message. A value of zero turns the message off, and a value of 1 turns the message on. Currently "CmsZeroRadiusCircle: ignoring circle statement with zero radius" is the only message that is supported.

**IntTruncAdj** - this new function is identical to **IntTrunc**, except that it automatically adjusts for computer roundoff errors. The following are the results you can expect:

#1 = TRUNC[4.1]	(ANSWER: 4)
#2 = TRUNC[-4.1]	(ANSWER: -4)
#3 = TRUNC[4.1 - .1]	(ANSWER: 3)
#4 = TRUNC[-4.1 + 1]	(ANSWER: -3)
#5 = TRUNC_ADJ[4.1]	(ANSWER: 4)
#6 = TRUNC_ADJ[-4.1]	(ANSWER: -4)
#7 = TRUNC_ADJ[4.1 - .1]	(ANSWER: 4)
#8 = TRUNC_ADJ[-4.1 + .1]	(ANSWER: -4)

# VERICUT 6.0.3 Interim Release

## Release Notes

November 2, 2006

VERICUT Version 6.0.3 contains everything described above for V6.0.2, plus these additional fixes/enhancements.

### Machine Simulation

Macro **CircleIntermediatePoint** is enhanced so that it is now "unit" sensitive.

VERICUT no longer delays when Machine Simulation is turned on, and no Machine Simulation license is available.

The VERICUT session no longer "hangs" when Machine Simulation is turned on, and no Machine Simulation license is available.

A problem causing a delay, while VERICUT attempts to check out a Multi-Axis license, during the first tool axis change after pressing Play is fixed.

A problem causing incorrect material removal under certain conditions when using a sub-spindle is corrected.

Unexpected VERICUT termination no longer occurs when loading a machine that has a Tool Chain that is not in Subsystem ID 1.

Unexpected VERICUT termination no longer occurs when scanning a line longer than 198 characters.

A problem causing Fixture models to disappear from the display, in a Machine/Cut Stock view, under certain conditions is corrected.

New macros are added to support mathematical functions for Heidenhain TNC 426/430 control.

### OptiPath

A problem causing OptiPath to produce different results in V6.0.2, than in V5.4.5, for certain conditions is fixed.

OptiPath now correctly optimizes subsequent tools after an OptiPath record is deleted in Tool Manager.

A problem preventing optimization under certain conditions when Cutting Conditions and Tool Use graphs are both displayed is fixed.

A problem causing OptiPath to output incorrect feedrates, under certain conditions involving very long 5-axis moves is corrected.

Changing the number of teeth when OptiPath=Chip Thickness now correctly adjusts the Feed per Minute value seen in the OptiPath Settings window.

## **Tool Manager**

The correct diameter value is now output when creating a report from Tool Manager which has profile tools.

Sorting tool records in Tool Manager by Comments no longer results in "garbled" comment text.

Unexpected VERICUT termination no longer occurs when attempting to sort a specific tool list in Tool Manager by Comments.

A problem causing a non-spinning milling tool holder, to spin when used as a "referenced" holder, is fixed.

Tool ID data now aligns correctly with the rest of the data in a tool record in Tool Manager.

VERICUT no longer prevents adding cutting condition values for tools in the Tool Manager when you do not have an OptiPath license.

## **Verification**

A problem causing turning tools to rotate, and incorrect material removal to be displayed, when using Pro/MFG APT is fixed.

A problem causing missed tool changes when macro **MacroVar** is called with G65 is fixed.

The position displayed in the Component Tree now updates correctly when a component position is changed.

Focus is now correctly shifted to the new component when it is appended to Component Tree.

ATP CBOX now processes correctly.

VERICUT now finds project subroutines in the parent directory

A problem causing a bad graphics display when using VERICUT-COMMAND records to add and remove fixtures is fixed.

VERICUT is enhanced to prevent creating invalid tools by dragging/dropping revolved cutters to turning tools.

New project files, created after changing units, are now created with the correct units.

Reset Cut Colors is now correctly retained for VERICUT Solid files saved with features.

A problem causing incorrect results when using macro **Heid\_PolarMotionCW** in the YZ plane is fixed.

Unexpected VERICUT termination no longer occurs when certain concave bottom tool profiles are used with Constant Gouge Check.

A problem causing a very coarse material removal display for certain profile cutters is fixed.

A problem causing incorrect material removal for a specific ramping motion is fixed.

A problem causing false Fast Feed errors to be output under certain conditions is fixed.

A SpaceMouse can now be used with 64 bit VERICUT and OpenGL.

A problem causing false Fast Feed errors when using a specific tool is fixed.

A problem causing VERICUT to hang or terminate while using a Space Mouse to rotate an accelerated workpiece view is now corrected.

A problem causing VERICUT to hang or terminate while simulating with an Accelerated machine view and dragging/opening another windows on top of VERICUT, is fixed.

## **New Macros / Conditionals**

Macros:

- HeidCmdAdd**
- HeidCmd Assign**
- HeidCmdCos**
- HeidCmdCos**
- HeidCmdDivide**

**HeidCmdHypot**  
**HeidCmdIfEqual**  
**HeidCmdIfGreater**  
**HeidCmdIfLess**  
**HeidCmdIfNotEqual**  
**HeidCmdMultiply**  
**HeidCmdSin**  
**HeidCmdSquareRoot**  
**HeidCmdSubtract**  
**ToolSideOffsetMultiplier**

**Conditional:**

**HeidCondQWord**

**New Macros / Conditionals that are not yet included in the documentation**

**HeidCmdAssign** – Store the value specified by the second argument in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdAdd** – Adds the values of the second and third arguments, and store the results in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdSubtract** - Subtracts the third argument from the second argument, and stores the results in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdMultiply** - Multiplies the values of the second and third arguments, and store the results in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdDivide** - Divides the second argument by the third argument, and stores the results in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdSquareRoot** - Takes the square root of the second argument and stores the result in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdSin** - Takes the sine of the second argument (in degrees) and stores the result in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdCos** - Takes the cosine of the second argument (in degrees) and stores the result in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdHypot** - Takes the square root of the sum of the squares of the second and third arguments, and store the result in the variable specified by the first argument. Arguments are set using **ValueArgument** and **VariableArgument**.

**HeidCmdIfEqual** - Compares the first two arguments and sets the "if condition" to TRUE if they are equal, and FALSE if they are not equal. Arguments are set using **ValueArgument** and **VariableArgument**.

**NOTE:** The various GOTO/JUMP macros are only executed when the "if condition" is TRUE.

**HeidCmdIfNotEqual** - Compares the first two arguments and sets the "if condition" to TRUE if they are not equal, and FALSE if they are equal. Arguments are set using **ValueArgument** and **VariableArgument**.

**NOTE:** The various GOTO/JUMP macros are only executed when the "if condition" is TRUE.

**HeidCmdIfGreater** - Compares the first two arguments and sets the "if condition" to TRUE if the first argument is greater then the second, and FALSE if they are not. Arguments are set using **ValueArgument** and **VariableArgument**.

**NOTE:** The various GOTO/JUMP macro are only executed when the "if condition" is TRUE.

**HeidCmdIfLess** - Compares the first two arguments and sets the "if condition" to TRUE if the first argument is less then the second, and FALSE if they are not. Arguments are set using **ValueArgument** and **VariableArgument**.

**NOTE:** The various GOTO/JUMP macro are only executed when the "if condition" is TRUE.

**ToolSideOffsetMultiplier** - Sets a multiplier for the tool offset. It is intended to give the capability to inverse the direction of the offset in case the internal calculations has it going the wrong direction.

The text value is used to specify which axis to apply the multiplier (X, Y, or Z). The numeric value passed to this macro specifies the multiplier.

**NOTE:** This macro should only be used in rare situations as directed by CGTech Technical Support.

The following new Conditional Function has been added.

**HeidCondQWord** – If the Q word comes after a D0 or a D1 string and prior to a P0 string, then this conditional function returns the type COMMAND. Otherwise this conditional function returns the type VARIABLE TAG

# VERICUT 6.0.4 Interim Release

## Release Notes

**December 15, 2006**

VERICUT Version 6.0.4 contains everything described above for V6.0.3, plus these additional fixes/enhancements.

The primary focus of V6.0.4 is to improve the stability of VERICUT. Some sites have been experiencing "random" unexpected VERICUT termination. A "random" unexpected VERICUT termination is defined as one that is not repeatable and cannot be duplicated. Significant effort has been made to identify, and eliminate, possible sources of these random terminations and thereby improving the stability of VERICUT.

OptiPath now outputs correct spindle speeds for tools having the tool profile bottom below  $Z = 0$ .

# VERICUT 6.0.5 Interim Release

## Release Notes

**January 29, 2007**

VERICUT Version 6.0.5 contains everything described above for V6.0.4, plus these additional fixes/enhancements.

Abnormal VERICUT termination no longer occurs when pressing Play prior to the end of processing when a Machine view is displayed but no Machine Simulation license is present.



