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# CAM-TOOL

CAD/CAM System for Molds & Dies

System Requirements

|          |                                                                    |
|----------|--------------------------------------------------------------------|
| OS       | Windows 7 Professional 64bit<br>Windows 8 (8.1) Pro 64bit          |
| CPU      | Multi-Core Processor                                               |
| MEM      | 8GB or more                                                        |
| HDD      | 80GB or more                                                       |
| Graphics | 3D Acceleration OpenGL board (NVIDIA series)<br>Memory 1GB or more |



**CGS** C&G SYSTEMS INC. [www.cgsys.co.jp](http://www.cgsys.co.jp)

**Facebook** <http://www.facebook.com/CGSYS>  
**Youtube** <http://www.youtube.com/user/CGSYS0777>

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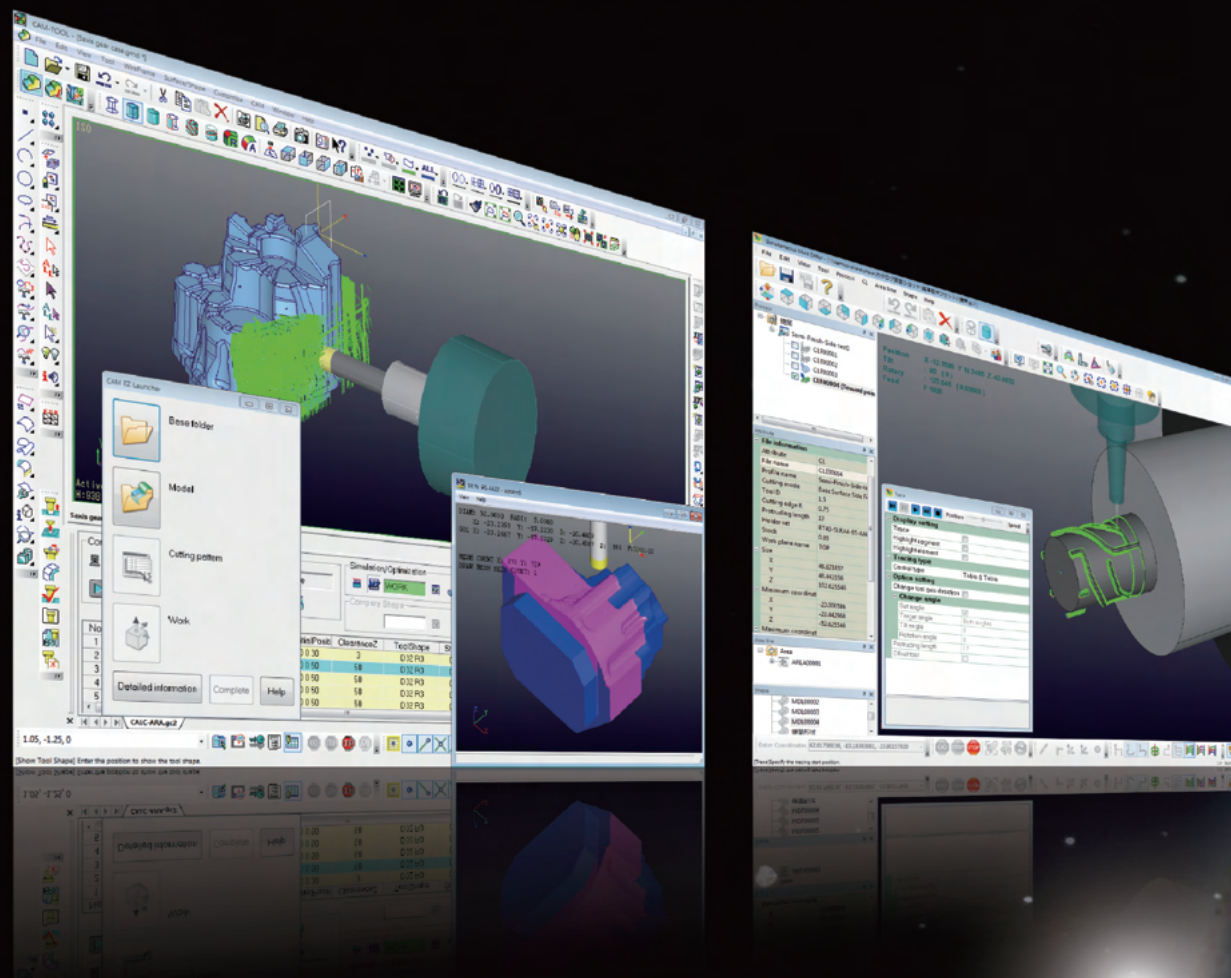
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Reseller

CAD/CAM SYSTEM for Molds & Dies

## "World's Reputable CAM Program creates Preeminent Molds & Dies"

CAM-TOOL is a five-axis-control-machining-center compatible,  
high-end CAD/CAM system with a hybrid CAM engine (Polygon and Surface Calculation).  
This Hybrid capability enables the direct machining to be applied to materials with high degree of hardness.  
In addition, it allows high quality and highly efficient machining in other situations.



### MODELING

Original Kernl surface modeler is  
excellent for modeling for Mold & Die work

### HOLE & 2.5D CAM

Operation integrated into 3D CAM  
achieves efficient and safe machining.

### 3D CAM

Suppress Tool load fluctuation even  
in High speed direct cutting  
on high hardness steel.

### 5-AXIS CAM

Provides the precise 5-axis machining  
by the same operation as 3-axis.

### SPEED & SAFETY

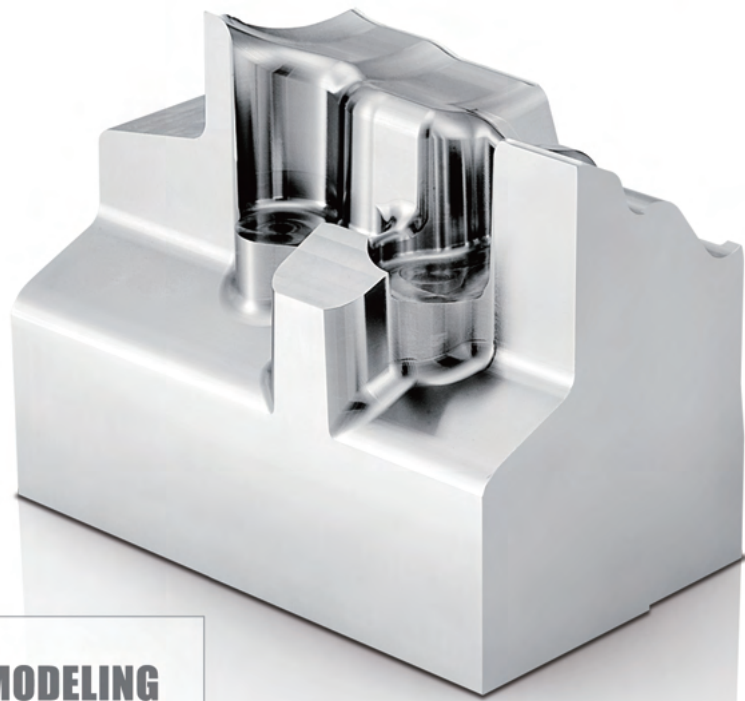
Additional Functions for productivity  
and safety.

### OUTPUT & SOLUTION

Additional Solutions for automation  
and labor saving.

# QUALITY

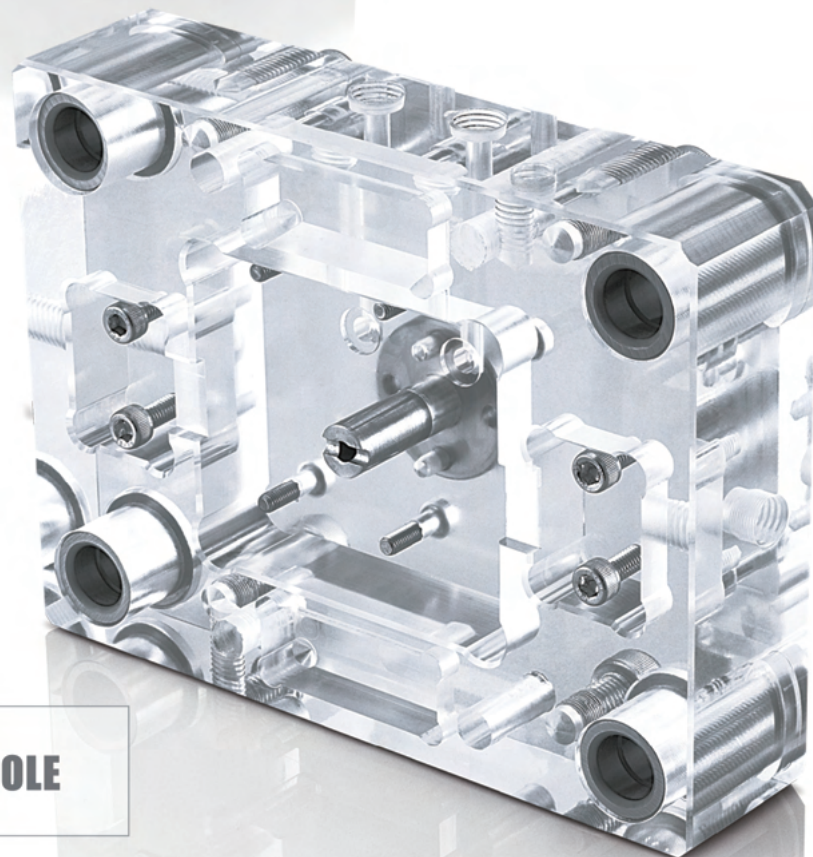
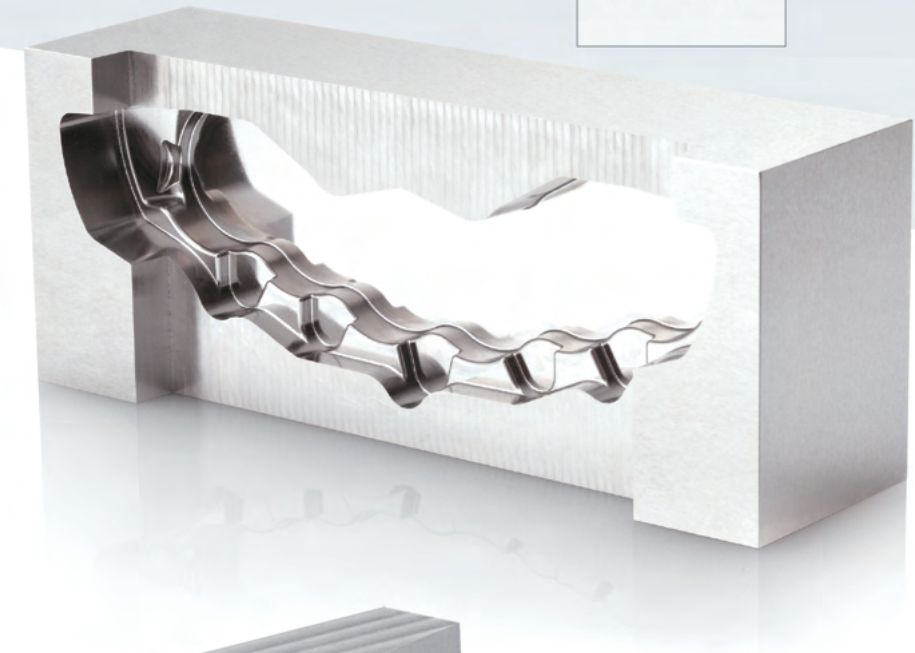
From Modeling to Simultaneous 5-Axis Machining,  
CAM-TOOL strongly supports the Mold & Die Manufacturing Process  
with tools that make your life easier and more profitable.



**MODELING**



**3D CAM**



**2.5D CAM**

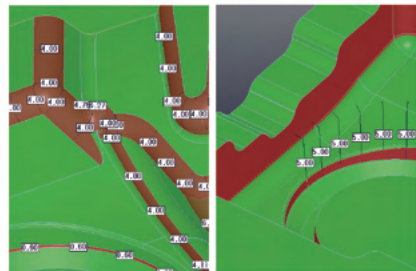
**HOLE**

**5 AXIS CAM**



## MODELING

Original kernel surface modeler is excellent for modeling for Mold & Die work

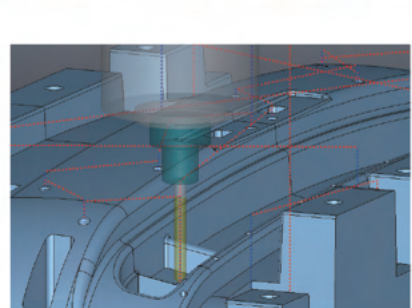
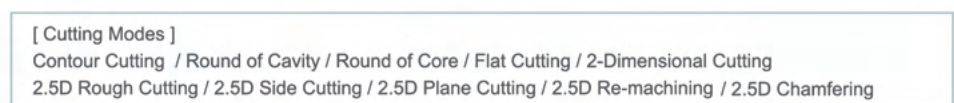
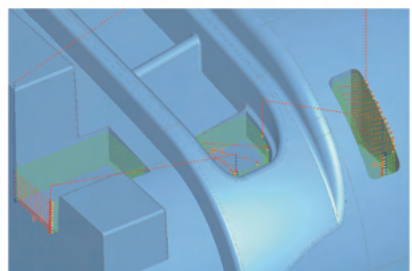
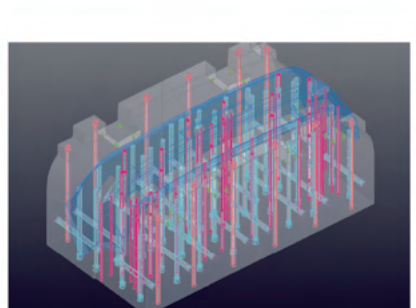


Curvature Radius Shading/  
Fillet Surface Radius Info  
Angle Shading / Draft Info

Display of different radius & draft angle of shape in different colors and values help to decide the shank and protruding length of the tool.

## HOLE & 2.5D CAM

Operation integrated into 3D CAM achieves efficient and safe machining.



### 2.5D CAM

It's possible to set multiple sections at the contour of wire frame and define a pocket and an island shape. Section and plane parts which are machined by 2-axis/2.5-axis in the surface model are detected and cutter paths are generated.

### HOLE

Hole feature can be defined by Entity, based not only on Point Circle but Arc/Curve/Surface. Hole processes are controlled on the "Calculation Process List" the same as 2.5D/3D. This provides safe Hole cutting because of interference checking for the remaining stock model after machining. It is also possible to improve efficiency of Hole cutting thanks to optimized CL.

- [ Cutting Modes ]
- Contour Cutting / Round of Cavity / Round of Core / Flat Cutting / 2-Dimensional Cutting
  - 2.5D Rough Cutting / 2.5D Side Cutting / 2.5D Plane Cutting / 2.5D Re-machining / 2.5D Chamfering

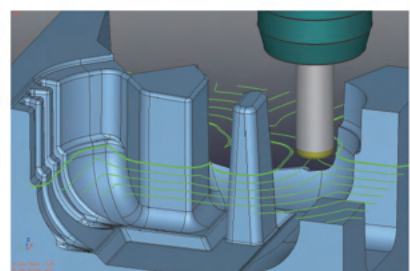
## FUNCTIONS

From Modeling to Simultaneous 5-Axis Machining, CAM-TOOL strongly supports the Mold & Die Manufacturing Process with tools that make your life easier and more profitable.

## 3D CAM

Suppress Tool load fluctuation even in High speed direct cutting on high hardness steel.

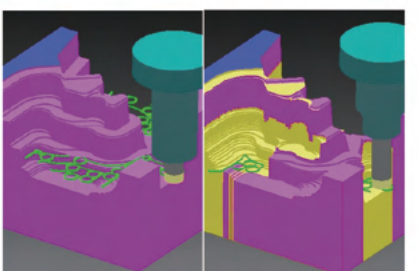
### Roughing



#### Z-level Rough Cutting with Multiple Tools

This is a rough cutting mode that performs Z-level offset cutting working from a raw block. Efficient Re-roughing cutter paths are created only for the remaining areas where the system detects on the previous process accurately.

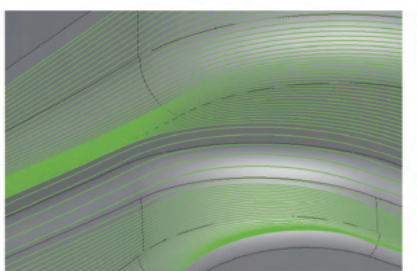
### Partial Cutting



#### Avoid Tooling Interference

This is an expanded function of "Z-level Rough Cutting with Multiple Tools". The system automatically specifies non-interference areas with tooling shapes, then generates cutter paths. It reduces operation time to create the roughing processes for each protrusion length.

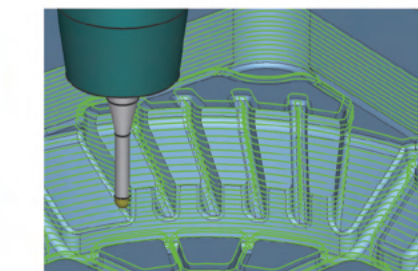
### Finishing



#### Curve Control Along Surface

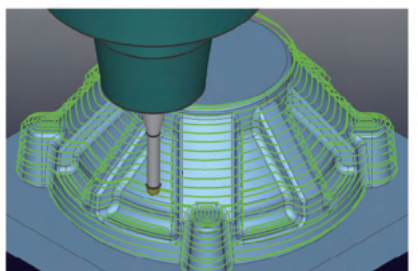
This mode cuts along 3 dimensional surfaces within the closed area enclosed by contours. U/V of surfaces don't affect the cutter paths. Air-cut can be reduced especially for a large metal mold.

### Simultaneous 5-Axis



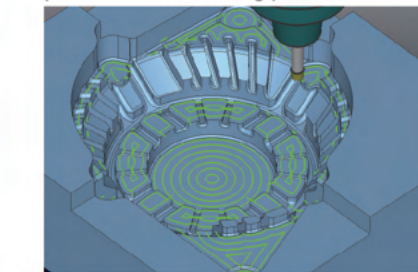
#### Z-level Finishing

Performing Z-level cutting, which uses climb cutting, suitable for high-speed and high-precision machining, enables a high-quality surface finish required for mold manufacturing. It is also possible to cut near-horizontal areas by adding "Offset cutting", or by using "Low Lying Processing" or "Scanning-Line area" together. With a variety of useful parameters and functions like "Spiral cutting", Z-level Finishing has been widely used from the semi-finishing process to the finishing process.



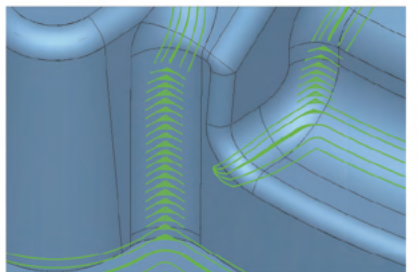
#### Spiral cutting

This is a function for re-processing the regions that were left uncut, using a smaller tool. The climbing cut is always performed and cutter paths traveling around (contour line) are output. The output NC data consists of G01 with simultaneous two axes (Simultaneous three axes for slant cutting). This mode is useful for the shape, containing many horizontal areas and requiring bottom machining with a flatnose tool.



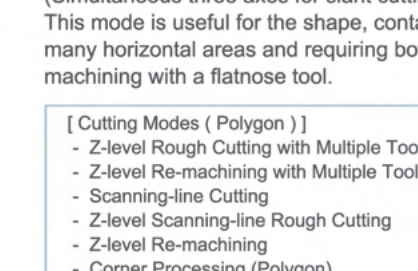
#### Horizontal Area Cutting

Horizontal areas of the specified shape are automatically detected and machined. The climbing cut is always performed and cutter paths traveling around (contour line) are output. The output NC data consists of G01 with simultaneous two axes (Simultaneous three axes for slant cutting). This mode is useful for the shape, containing many horizontal areas and requiring bottom machining with a flatnose tool.



#### Re-machining

This is a function for re-processing the regions that were left uncut, using a smaller tool. The climbing cut is always performed and cutter paths traveling around (contour line) are output. The output NC data consists of G01 with simultaneous two axes (Simultaneous three axes for slant cutting). This mode is useful for the shape, containing many horizontal areas and requiring bottom machining with a flatnose tool.



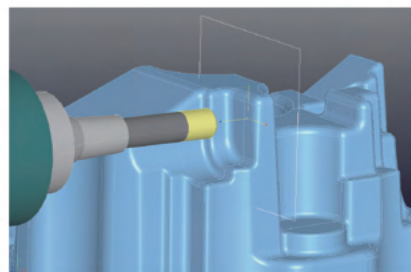
#### Extension Surface

"Surfaces not to machine" or "Different stock surfaces", etc. can be specified at "Shape setting". It allows more efficient tool path for machining to be created easily.

## 5-AXIS CAM

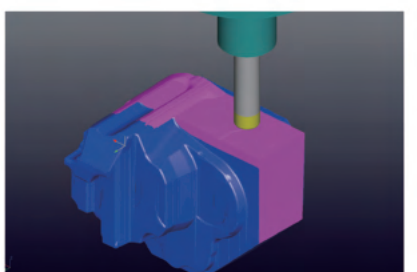
Provides the precise 5-axis machining by the same operation as 3-axis.

### 3 + 2 Axis



#### Determination of Machining Direction

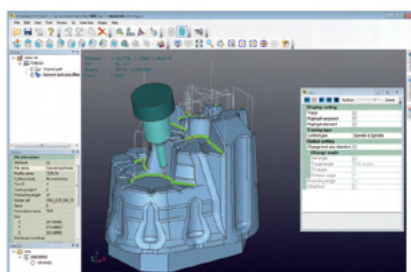
Provides a variety of commands such as "Undercut Check", "Extract FlatPart", "Angle Shading", for determining machining direction that is needed for 3+2 axis machining. Specifying work plane for determining machining direction, plus saving and returning to the work plane setting can be done with a simple operation.



#### Optimization from Multiple Directions

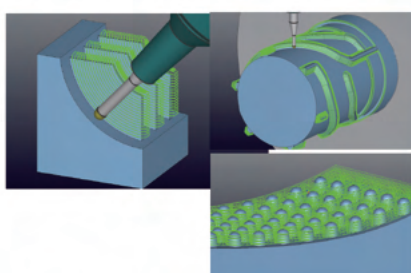
Optimization for 3+2 machining can be performed effectively after CAM calculation. Optimizations such as "Simulation" that includes displaying undercut areas and "Delete air-cut" by machining from multiple directions, make it possible to provide efficient and highly reliable machining data.

### Simultaneous 5-Axis



#### 5-Axis conversion function

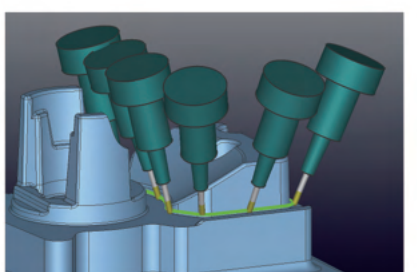
Creates 5-axis Simultaneous tool paths, by adding the information about tool direction to 3-axis tool paths. In converting tool paths, "smoothing control" adjusts the tilt axis and rotation axis to make the Machine Tool move more smoothly. It is also possible to have the tool tilt gradually before the point where the tool direction changes rapidly. These functions provide high-quality finished surfaces.



#### Base surface modes

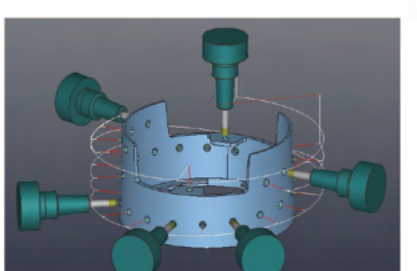
"Base surface modes" in simultaneous 5axis CAM are new powerful cutting modes to create tool path on specified base surface. It achieves extreme quality surface finish by the surface calculation characterizing CAM-TOOL. In can eliminate retracts substantially, so it will also prevents the deterioration of surface finishing, and furthermore, it reduces cutting time!

### Simultaneous 5-Axis



#### Automatic interference avoidance

Collision of Tool, Chuck and Holder with the shape can be avoided by controlling tilting axis automatically. Change tool direction gradually to avoid drastic change of tool direction. It minimizes the cutting mark.



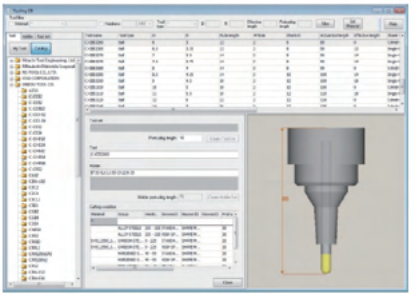
### Multi-Axis Drilling

G01 cycled drilling data for multi-directional holes can be processed by single profile. It is allowed to create safe and efficient drilling data, corresponding to "Check Interference", "Cutting Simulation" and "Machine Simulation".

- [ Simultaneous 5-Axis Cutting Modes ]
- Swarf Cutting
  - Z-level Undercut Finishing
  - Undercut Curve Control Along Surface
  - Undercut Re-machining
  - Base Surface ( Rough Cutting / Side Finishing / Bottom Finishing )
  - G01 Drilling - 5X

## SPEED & SAFETY

Additional Functions for productivity and safety.



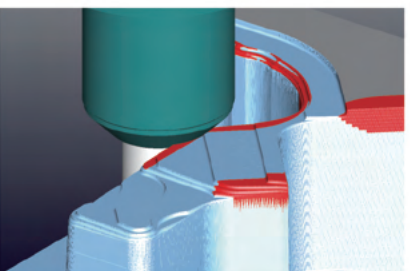
#### Tooling Data base

Tooling DB manages Tool, Holder and its cutting conditions. It can define Tool shank shapes flexibly, such as multi-tapered or radius shank. Furthermore, users can download the catalog data of tool and holder information from our WEB site. Users can filter the tool with effective length and materials easily, and define a tool set which is combined with tool and holder.



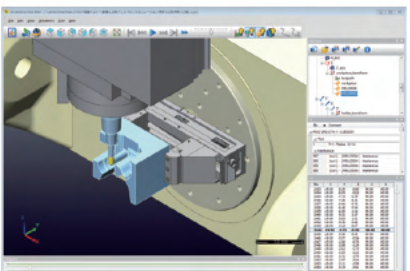
#### Surface Group / Template

Registering each machining surface (ex. PL Surface, Product Surface) as specified groups makes the shape setting operation for CAM easier. It also automatically set shapes at once for plural machining processes when using "Template".



#### Optimization / Cutting Animation

Optimization can be performed with Tool registered in DB and simulates the milling to show the condition of the work after machining and to also check the interference point. It's also possible to generate tool path more efficiently and safely because of "Delete air-cut", "Auto clearance", "Variable feed rate", etc. It is now possible to see the animated machining process after optimization.



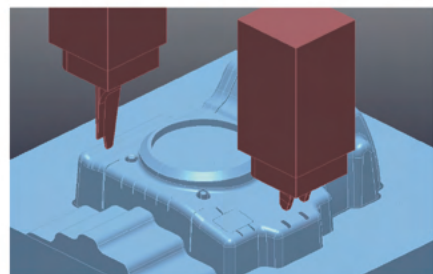
#### Machine Simulation (Option)

Possible to detect CL interference against the component parts of machine-tool, and verify stroke-range for each axis. Utilizing the same GUI as "Simultaneous 5-axis Editor" provides the consecutive and user-friendly environment for easy operation.

- [ Main Function ]
- CL information / Trace / Move / Copy
  - Delete CL partially
  - Modify Approach
  - Change Approach Position

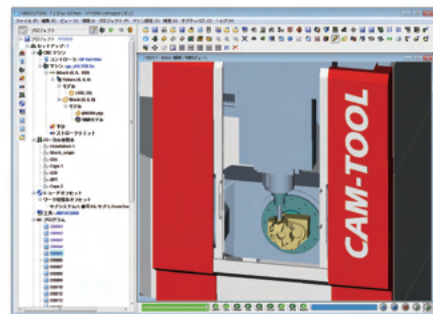
# OUTPUT & SOLUTION

Additional Solutions for automation and labor saving.



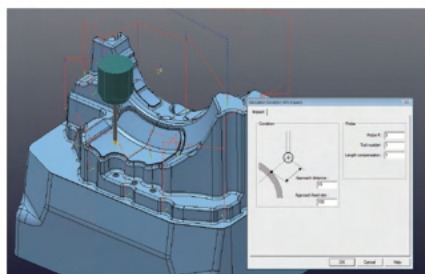
## Create Electrode (Option)

This extracts electrode shape from the work model, and has a wide variety of functions, such as "Fill in Blank", "Move Electrode", "Fluctuation Offset", etc. It also corresponds to EPX format for EDM.



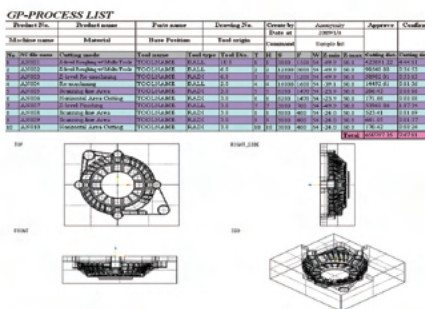
## Vericut Interface (Option)

Vericut interface provides seamless operability from CAM-TOOL to Vericut. It starts from Vericut Icon in CAM-TOOL then exports data of tooling (tool and holder), NC program name, tool number and stock model information into Vericut automatically.



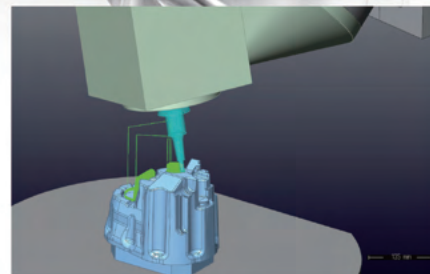
## OM Inspect (Option)

This is the command for inspecting the machining precision directly on a machine. Accurate inspection is possible by using the same system for both creating machining data and setting points to inspect. Efficient inspection is possible, and outputting an inspection result into a file is also available.



## Process Sheet

NC Process sheet or tool list can be output when NC data is created.



## Post processor

Using the NC Machine Parameter File format, the major CNC controller are available. NC data can be output by simple settings.

Various type of 5 axis machine tools such as Head rotation type, Table rotation type and Mixed type, are available.

[5-axis positioning compliant]  
Tool Center Positioning Control  
Tilted working plane command

[5-axis Simultaneous compliant]  
Tool Center Positioning Control

## Calculate Machining Time

NC data is analyzed and machining time prediction which made the error span of time less than  $\pm 10\%$  is performed.

## 3D Mouse (Option)

3Dconnexion's 3D Mouse is supported. Operability for view control, such as Zoom-in/out and Pan, will be improved significantly by less clicking.

# Data Translate

High quality translation for most famous native CAD systems.

| Import    |             |              | Export    |             |
|-----------|-------------|--------------|-----------|-------------|
| IGES      | CATIA V5*   | CADmeister*  | IGES      | Parasolid*  |
| STEP      | Parasolid*  | Thinkdesign* | STEP      | SolidWorks* |
| DXF / DWG | NX*         |              | DXF       |             |
| STL       | SolidWorks* | *Option      | CATIA V5* | *Option     |

# System Module

It is the method of adding a module and change to the system configuration united with business is possible.

| Use                 | Viewer | Modeling | HOLE | 2D Milling | 3D Milling | 3+2 Axis Milling | 5 Axis Milling |
|---------------------|--------|----------|------|------------|------------|------------------|----------------|
| Main Module         |        |          |      |            |            |                  |                |
| Base                | ●      | ●        | ●    | ●          | ●          | ●                | ●              |
| Modeler             | —      | ●        | ○    | ○          | ○          | ●                | ●              |
| Postprocessor       | —      | —        | ●    | ●          | ●          | ●                | ●              |
| HOLE                | —      | —        | ●    | ○          | ○          | ○                | ○              |
| 2.5D CAM            | —      | —        | —    | ●          | ○          | ○                | ○              |
| 3D CAM              | —      | —        | —    | —          | ●          | ●                | ●              |
| CL Editor           | —      | —        | —    | ○          | ○          | ○                | ○              |
| 3+2 Axis            | —      | —        | —    | —          | —          | ●                | ●              |
| Simultaneous 5 Axis | —      | —        | —    | —          | —          | —                | ●              |

● Indispensable ○ Selectable

|               |                                                                  |
|---------------|------------------------------------------------------------------|
| Option Module | Create Electrode                                                 |
|               | OM Inspect                                                       |
|               | Machine Simulation                                               |
|               | Vericut Interface                                                |
|               | Translator                                                       |
| Package       | CAM Processor                                                    |
|               | Calculate Machining Time                                         |
| BaseZero      | This is the functional limited package products of "BaseModule". |

# Modern Architecture

Native correspondence is carried out at the 64-bit OS environment. It was released from memory restrictions and comfortable work environment is realized also to large scale.

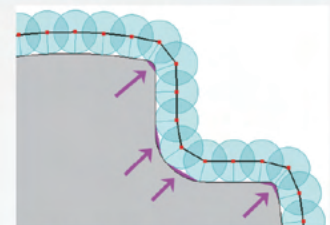


Native 64-bit Software  
Multi-Core & Multi-Processor  
Hyper-Threading

# High-precision

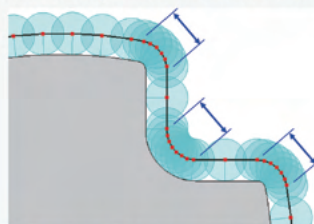
"Gpcam" is the Heart and Soul of CAM-TOOL with its "Tool Path directly from the Surface Calculation" using its proprietary algorithm which allows it to achieve high-precision machining

In the case of "Triangulation Mesh Calculation" that many CAM systems adopt, the positional accuracy is degraded since the tool-path is generated along the Triangular shapes that are approximated from surfaces of the CAD model. In the case of the "Surface Calculated Tool Paths" of CAM-TOOL, there is no approximation of the surface shape, so it is possible to keep the accuracy of tool-path. Since there is no gap from CAD data, CAM-TOOL's distinguished algorithm calculates the tool contact points on the original surfaces.



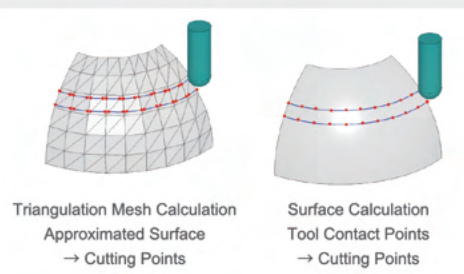
Considerable Over-cuttings and Remains

When machining by the tool-path with component points created using "chordal deviation" (tolerance in some CAM Systems), there is the possibility of considerable over-cutting (gouging) and leaving remains (stock) at particular areas with large or discontinuous curvature, and that may cause deterioration in the accuracy of the net shape.



Relocation of Component Points of Tool-path

CAM-TOOL calculates relocation of component points of the tool-path using its special algorithm, corresponding to curvature of the shape. This calculation enables the proper relocation of component points along the shape. This also achieves an accurate tool-path that is a tremendous advantage over the other CAM Software for an accurate reproduction of the model shape.



Triangulation Mesh Calculation  
Approximated Surface  
→ Cutting Points

Surface Calculation  
Tool Contact Points  
→ Cutting Points

# MachinigTechnology Center

CGS's Machining Technology Center is managed by technical experts, to support R&D activities. The Technology Center is engaged in the testing and verification of the CAM System's developments. In addition, evaluation of the latest cutting-materials, cutting-tools and bench marks for our customers are responsibilities of the Tech Center. It is also aggressively involved in technology exchanges with cutting-tool manufacturers, machine-tool manufacturers and educational institutions.



# PRODUCTS

SOLIDWORKS Add-in CAM system

## CG CAM-TOOL

CG CAM-TOOL is a totally new CAM System. Its main strengths are an easy to use Interface and a simple Template capability that allows high precision/quality results for the Mold & Die Industry. It is also excellent for the machining of small to medium sized parts. It benefits from the fact, that at the heart is the CAM Engine of CAM-TOOL. Using CG CAM-TOOL will expedite your business startup even if your operators are inexperienced, as the Tool Database and Template capabilities will create a consistent output.

