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## What's New in CAMWorks 2010

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## General Operation

### Updated - Build Info File

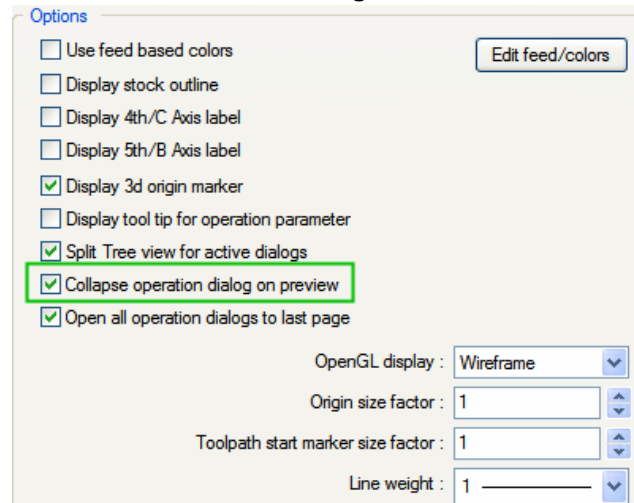
- Purpose** Report errors that have been corrected in the current build of CAMWorks 2010.
- Implementation** On the Start|Programs menu, select CAMWorks2010, then select Resolved CPR's. You can also open the file CW2010BuildInfo.rtf in the \lang\xxxx folder (where xxxx is the language: e.g., \lang\english).

### New – Windows 7 Support

- Purpose** Support CAMWorks in Windows 7.
- Implementation** CAMWorks 2010 and 2010x64 will run in SolidWorks/CAMWorks Solids 2010 on Windows 7 Professional, Ultimate and Enterprise editions.

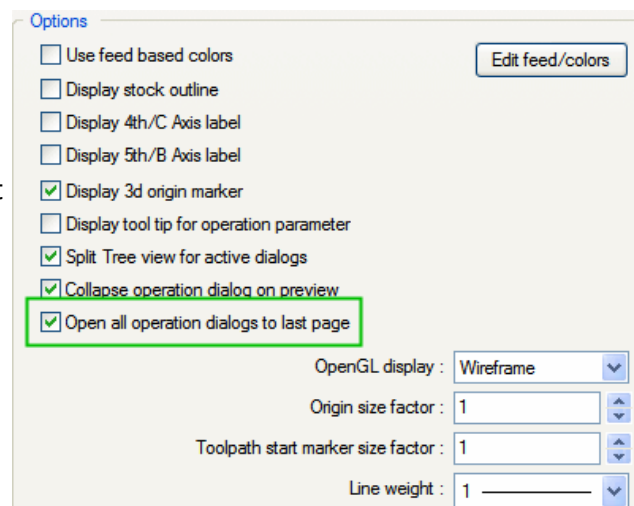
### New – Operation Dialog Preview Display Option

- Purpose** Provide an option when selecting Preview in an operation dialog box so the dialog box does not collapse automatically. This is beneficial to users running dual monitors.
- Implementation** A *Collapse operation dialog on preview* option on the Display tab in the CAMWorks Options dialog box controls the automatic collapse.



### Improved – Operation Dialog Box Active Tab

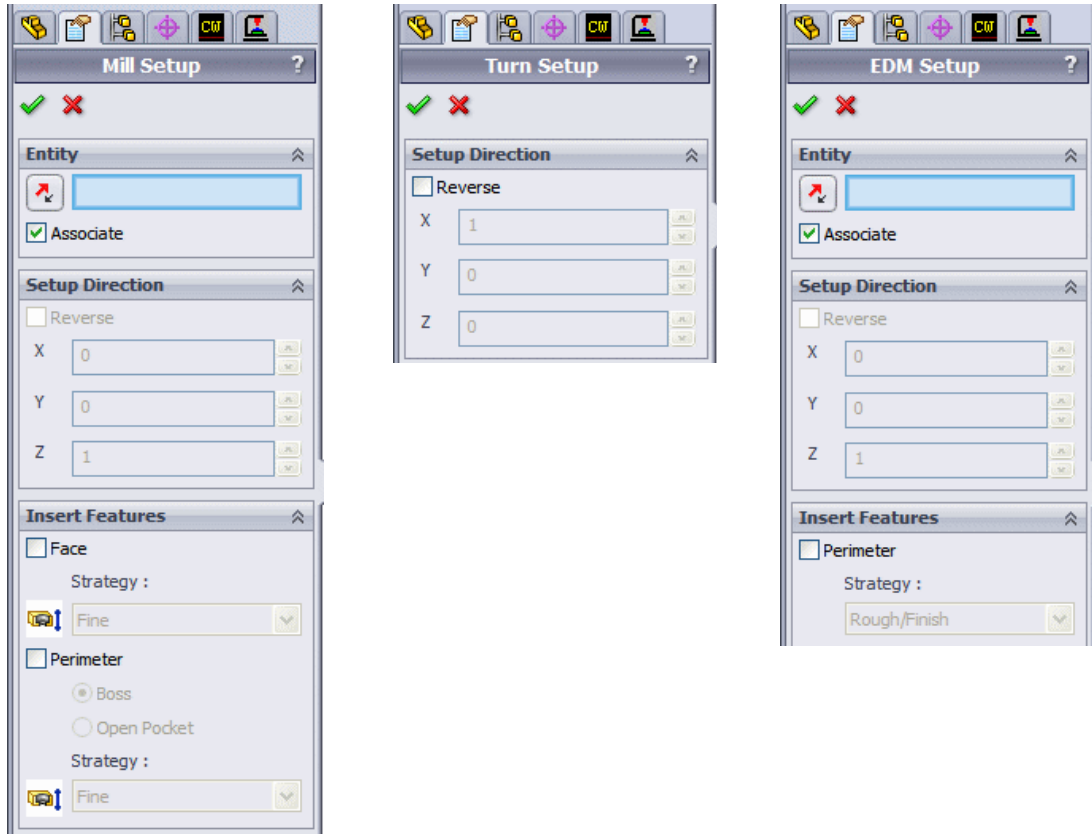
- Purpose** Provide an option that controls which tab is active when operation dialog boxes are opened.
- Implementation** The *Open all operation dialogs to last page* option on the Display tab in the CAMWorks Options dialog box controls whether all operation dialog boxes open to the active tab of the last closed dialog box (checked) or the first tab in the dialog box (unchecked).



**Improved – Convert Insert Setup Dialog Boxes to PropertyManager Format**

**Purpose** Convert Insert Mill, Turn and EDM Setup dialog boxes to the PropertyManager format.

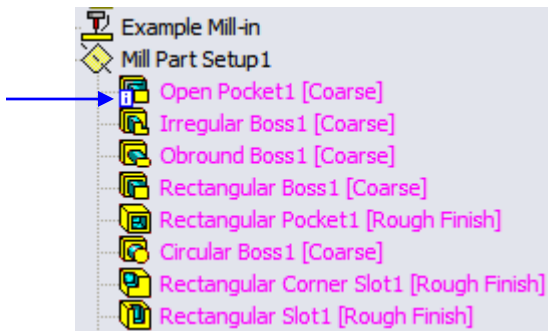
**Implementation** As part of an ongoing project to update the CAMWorks user interface, the Insert Mill, Turn and EDM Setup dialog boxes have been converted to PropertyManager format.



**Improved – Tree Icons**

**Purpose** Improve the identification of tree items.

**Implementation** Machine and Feature icons have been redesigned to be more three-dimensional. Interactively created Mill features are now identified with an "i" on the icon.



**Improved - Estimated Machine Time Calculation**

**Purpose** Improve the estimated machining time for mill and turn operations.

**Implementation** Numerous new time related parameters have been added to the definition of each machine in the TechDB. The machining time computation uses this information plus expanded consideration for changing federates, which results in closer estimates. In Turning, the estimated time now considers constant surface speed to estimate machining time.

**Improved – Recognition of Filleted and Tapered Features**

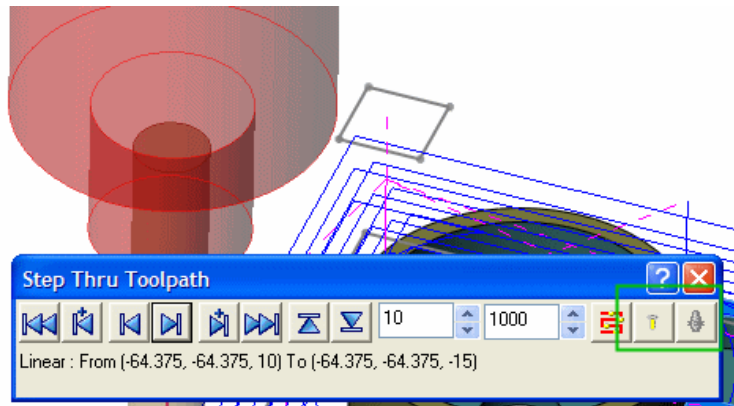
- Purpose Improve recognition of filleted and tapered features.
- Implementation Additional filleted and tapered features can be created using Interactive Feature Recognition.

**Improved – Shaded Mill and Turn Tool Display for Operations**

- Purpose Display the tool in shaded mode when the Tool page is active in an Operation dialog box.
- Implementation The display is based in the settings in Step Thru and Edit Toolpath; however, if a tool and/or holder display is set to None, the tool will display in shaded mode for operations.

**Improved – Shaded Mill and Turn Tool Display in Step Thru and Edit Toolpath**

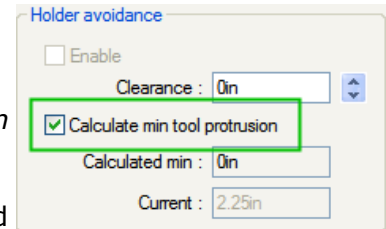
- Purpose Provide Shaded and Translucent display modes for tools and holders while in Step Thru or Edit Toolpath functions.
- Implementation Drop down buttons for mill and turn tool and holder displays have been added to the Step Thru Toolpath toolbar and the Edit Toolpath dialog box. Display modes are None, Wireframe, Translucent, Shaded and Shaded with Edges. When the display mode is changed in one of these functions, it is automatically updated in the other.



## Milling

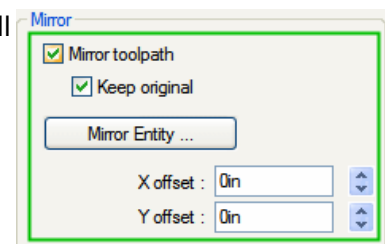
### New – 3 Axis Minimum Tool Protrusion Calculation

- Purpose** For 3 axis toolpaths, provide functionality to compute the minimum tool protrusion needed to avoid collision with the tool holder.
- Implementation** For Area Clearance, Z Level, Pattern Project, Pencil Mill, Constant Stepover, Curve Project and Flat Area operations, an option has been added to calculate the minimum tool protrusion. The *Calculate min protrusion* option on the Advanced tab is enabled when Enable holder avoidance is not active. When *Calculate min protrusion* is checked, the minimum protrusion needed to avoid a holder collision and the current protrusion are displayed. Based on these values, you can decide whether you want to change the current tool protrusion.



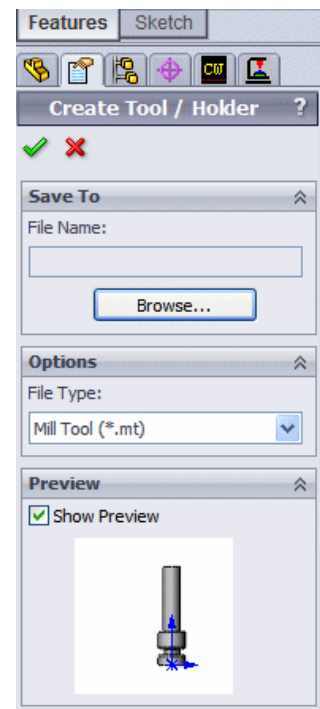
### New – Mirror Toolpaths

- Purpose** Allow toolpaths for each operation to be mirrored about an axis that lies in the XY plane.
- Implementation** Controls are provided on the Advanced tab of each mill operation to be able to mirror and offset the toolpath. This function is available for 2 Axis, 3 Axis Mill and Multiaxis Machining operations. This function is not supported for 3 Axis Rough and 3 Axis Finish operations and Mill operations where climb and conventional milling is active.



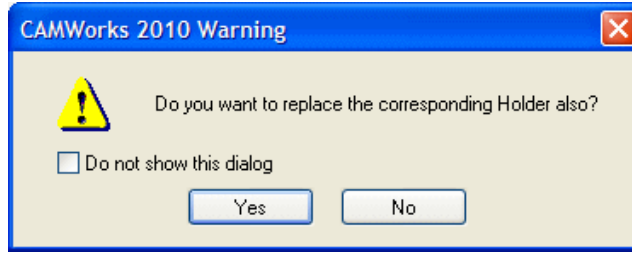
### Improved – User Defined Tools and Holders Utility

- Purpose** Convert the mill tool and holder utility user interface to the PropertyManager format.
- Implementation** The CW-Tooling Utility, previously available as a separate program in the CAMWorks Utilities, has been incorporated into CAMWorks. The *User Defined Tools and Holders* command on the CAMWorks menu displays the Create Tool/Holder PropertyManager. The User Defined Tools and Holders command is used to create user defined mill tools and holders.



**New – Omit Mill Holder Message**

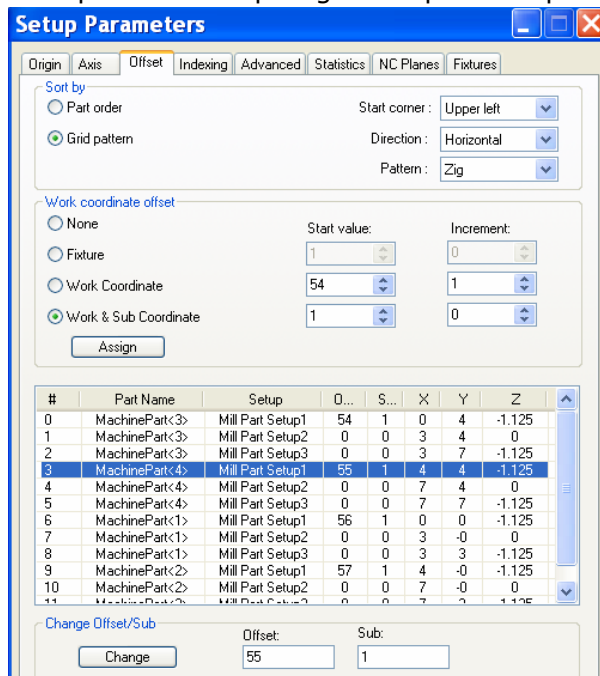
- Purpose Provide an option to omit the message to update the holder when changing mill tools.
- Implementation When the message displays, you can select to not show this message again.



Alternatively, the *Omit mill holder message* option on the General tab in the CAMWorks Options dialog box allows you to turn off/on the message.

**Improved – Assembly Mill Setup Offsets**

- Purpose In assembly mode Mill Setups, assign offset values based on the part name and mill part setup.
- Implementation The Offsets tab in the Setup Parameters dialog box displays an additional column in the table of offsets that indicates the Part Setup name. A vector displays from the operation setup origin and part setup origin to show what the offsets are.



**Improved – Contour Mill Toolpath Computation and Display Options**

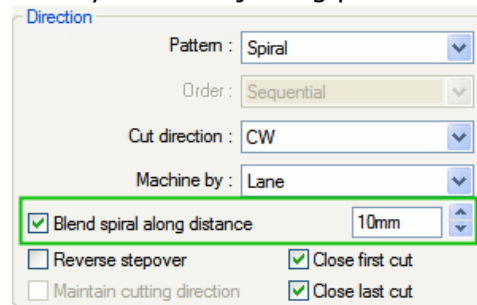
- Purpose Provide options for Contour Mill operation toolpaths when *CNC compensation* is set to On and *Toolpath center* is set to Without compensation.
- Implementation The Setup tab in the Machine dialog box for Mill and Mill-Turn machines contains options that affect the computation and display for Contour Mill toolpaths.

## Multiaxis Machining

### Improved – Spiral Toolpath

**Purpose** Apply the spiral motion to the entire toolpath or only the links joining passes.

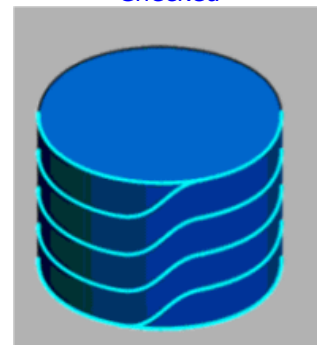
**Implementation** When Constant Z Slice cut is active with the Spiral pattern, the *Blend spiral along distance* option can be enabled to toggle the spiral behavior.



Unchecked



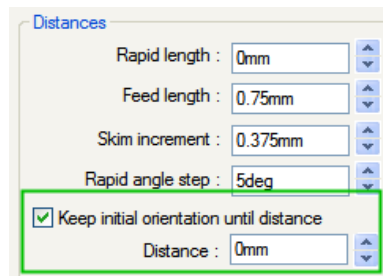
Checked



### Improved – Entry/Retract Tool Orientation

**Purpose** Allow the tool orientation to remain constant up to a user specified distance before contacting the part.

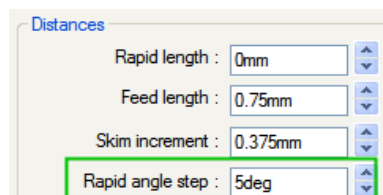
**Implementation** When the Clearance Type is set to Plane in Z, Plane in X or Plane in Y, new options are provided that maintain the tool's initial orientation while approaching and entering the clearance area. This orientation will be maintained up to a user specified distance.



### Improved – Entry/Retract

**Purpose** If a rapid move follows a cylindrical path, allow the user to control the number of steps to approximate the rapid move.

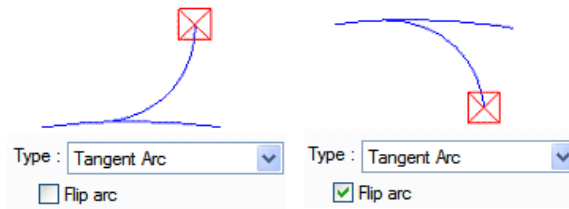
**Implementation** Rapid moves along a circular path are defined as multiple straight line moves. The number of these moves is defined on the Entry/Retract tab by defining a value for the *Rapid angle step*. A small value like 1 degree may cause some machines to slow down since the rapid moves are usually not smoothly interpolated by CNC machines. Larger values like 90 degree would avoid this problem, but then there is the potential of a collision because the moves are simplified to a square.



### Improved – Tangent Leadin/Leadout Arc Direction

**Purpose** Control the direction of a tangent leadin or leadout arc.

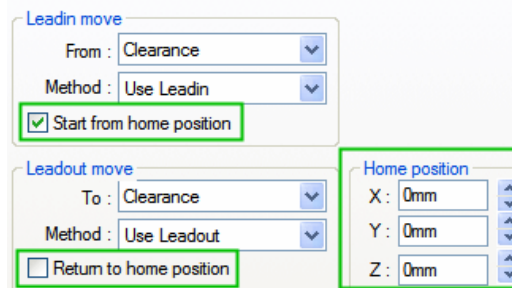
**Implementation** When the leadin or leadout move is specified with one of the tangent arc options, there are actually two possibilities of how the tangent arc can approach or retract from the part. The new option *Flip arc* will generate a tangent arc move that is mirrored relative to the current arc move.



### Improved – Leadin/Leadout Home Position

**Purpose** Allow the toolpath to start and/or return to a user defined home position.

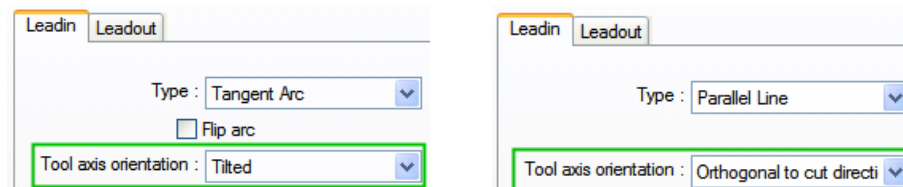
**Implementation** The Entry/Retract tab provides options to define the home position and whether to apply the home position to the leadin or leadout move.



### Improved – Leadin/Leadout Tool Axis

**Purpose** Provide additional control over the tool axis orientation during the leadin and leadout of a toolpath.

**Implementation** Previously CAMWorks supported Fixed and Tangent options for defining the tool axis orientation during the leadin or leadout moves. It is now possible to define that the tool axis will be at a tilted position for any leadin or leadout type. If the leadin or leadout is Parallel Line, an option to define the tool axis as *Orthogonal to cut direction* is available.

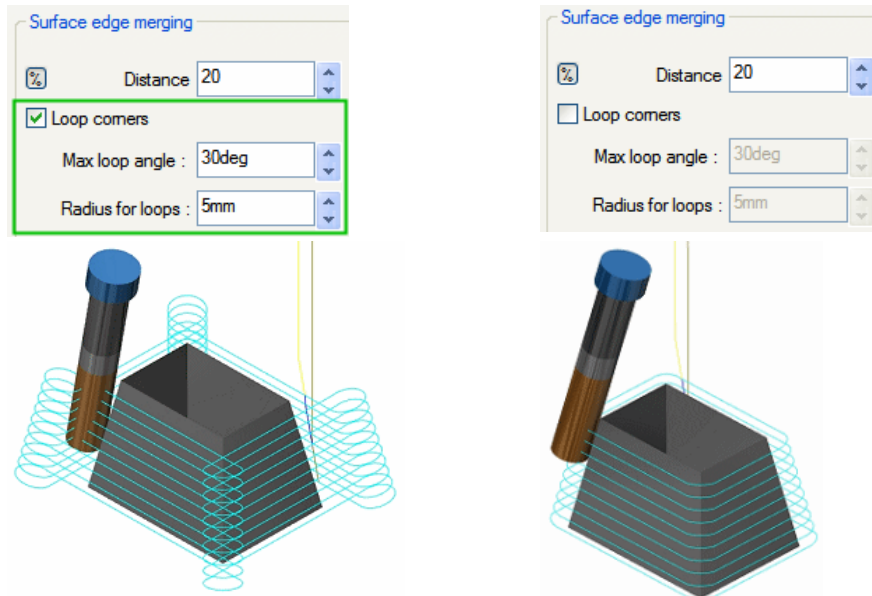




### Improved – Sharp Corner Control

**Purpose** Enable the toolpath to transition around a sharp edge corner in a loop to maintain the sharp edge.

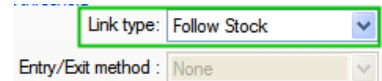
**Implementation** When the toolpath transitions around an external sharp edge, the toolpath rolls around the edge, which may result in a small amount of rounding on the edge. In order to maintain the sharpest possible edge, an option has been added to transition the corner with a loop. Additional controls are provided to define the corner radius and the max angle for the loop.



### Improved – Rest Machining

**Purpose** When a toolpath is computed with consideration of the work in process (rest machining), allow the toolpath to follow the stock shape when linking cuts.

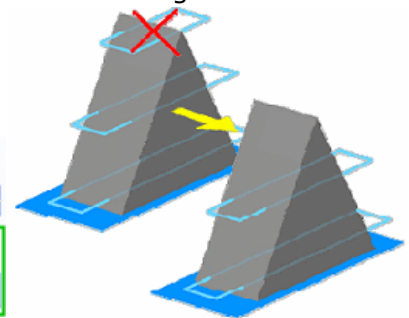
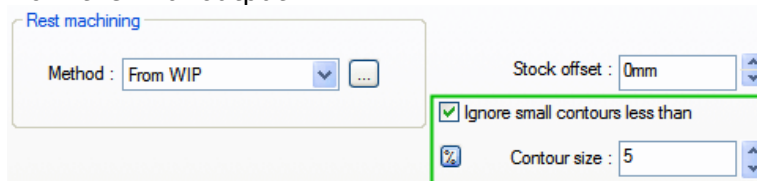
**Implementation** When Rest machining set to *From WIP* or *From STL File*, a new link type has been added on the Links tab that allows the link moves to follow the WIP or STL file.



### Improved – Rest Machining

**Purpose** Ignore small toolpath segments that may result during rest machining.

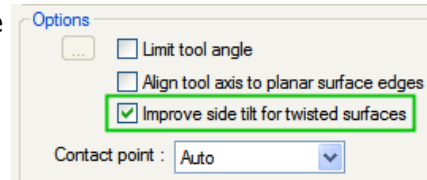
**Implementation** Rest machining may result in small areas of toolpath that could be omitted without affecting the machined area. It is now possible to filter small toolpath sections from the final output.



### Improved – Swarf Machining

**Purpose** Provide an option that attempts to take corrective action and produce a more regular motion to the tool axis if the tool axis becomes twisted during the swarf machining of impeller blades.

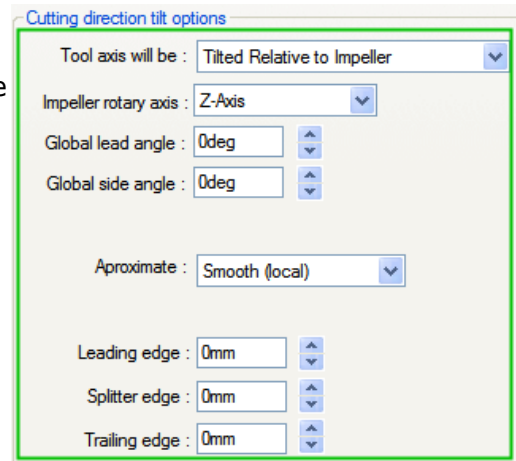
**Implementation** This option on the Axis Control tab is active when the Tool axis is *Tilted Relative To Cutting Direction* and the Side tilt strategy is set to *Follow Surface ISO Direction*.



### Improved – Impeller Blade Machining

**Purpose** Provide additional controls over the machining of impeller blades.

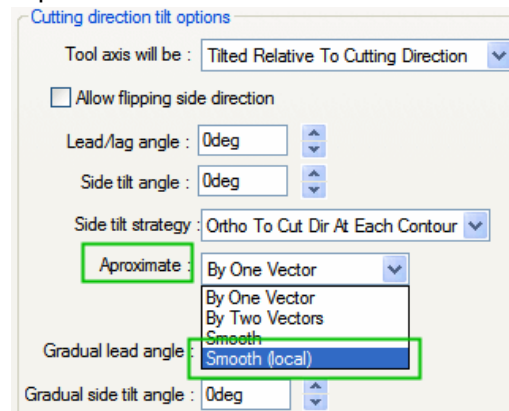
**Implementation** Numerous new options on the Axis Control tab allow greater control while machining impeller blades. These options are available when *Tool axis will be* is set to *Tilted Relative To Impeller*. The online help explains these controls.



### Improved – Tool Axis Control

**Purpose** Provide an additional option of smoothing toolpath vectors.

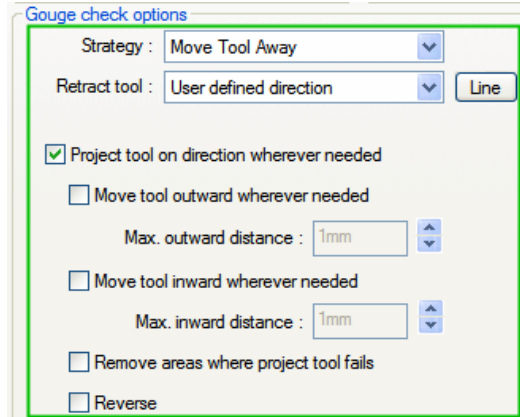
**Implementation** When *Tool axis will be* is set to *Tilted Relative To Cutting Direction* and the *Side tilt strategy* is *Ortho to Cut Direction At Each Contour*, the *Approximate* option now includes the selection *Smooth (local)*.



**Improved – Gouge Checking - Retract Tool in User Defined Direction**

**Purpose** Provide the ability to move the tool along a user defined direction.

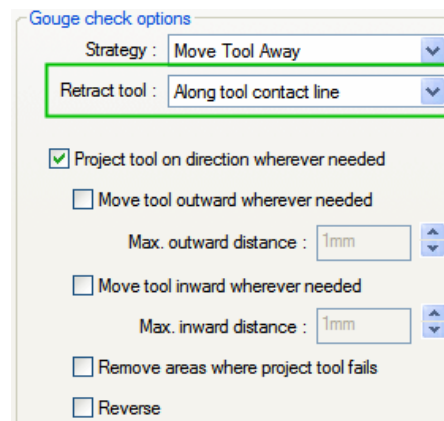
**Implementation** When the Gouge Check Strategy is set to *Move Tool Away*, the Retract tool options now include the ability to retract the tool along a *User defined direction*. When this option is selected, there are several settings to control how the tool is moved. These parameters are explained in the online help.



**Improved – Gouge Checking**

**Purpose** Allow the tool to retract along a vector computed as the intersection of the tool and faces.

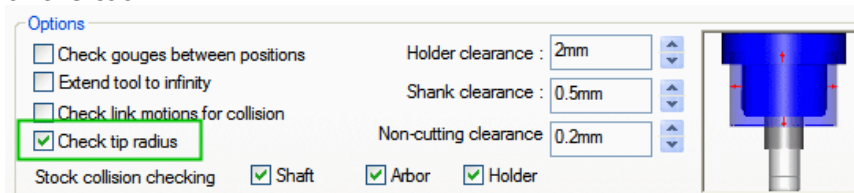
**Implementation** If swarf machining with a tapered tool, it is possible to have CAMWorks retract the tool along a line that is automatically calculated as a line of contact between the side of the tool and the feature faces.



**Improved – Gouge Checking Against Tip of Tool Only**

**Purpose** Gouge check against the tip of the tool only.

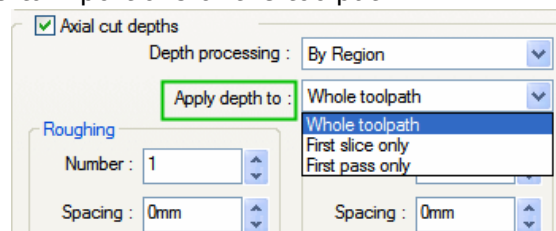
**Implementation** When the tool is a ball or hog nose, it is possible to gouge check only the tip radius of the tool.



**Improved – Roughing**

**Purpose** Apply the multiple axial cut depths to certain portions of the toolpath.

**Implementation** When Axial cut depths is selected on the Roughing tab, you can apply the multiple depths to the Entire Toolpath, the First slice only or the First pass only.



### Improved – Rotate Toolpaths

**Purpose** Allow a transform along the rotation axis to be applied to a rotated toolpath.

**Implementation** If rotating a toolpath, the rotated copies can be moved along the rotation axis. An initial transform distance, as well as a separate distance, can be specified for the second and subsequent rotated toolpaths.

Rotate toolpath

Rotate toolpath

Rotate about : Z Axis

Number of steps : 4

Start angle : 0deg

Rotation angle : 90deg

Sort by : Passes

% of toolpath : 50

Apply linking : Before rotation

Apply stock : After rotation

Transform start dist : 0mm

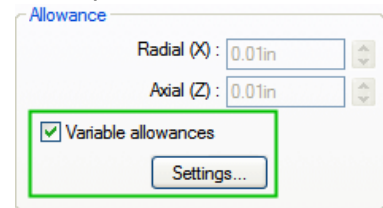
Transform step dist : 0mm

## Turn / Mill-Turn

### Improved – Turn Toolpaths with Varying Allowances

**Purpose** Provide the ability to define varying allowances on a turn toolpath.

**Implementation** A *Variable allowance* option has been added for Face Rough, Face Finish, Turn Rough, Turn Finish, Rough Groove, Finish Groove, Bore Rough, Bore Finish and Cutoff operations. When this option is checked, you can assign varying allowances to each segment in the feature



### New - Define Turn Stock from STL File

**Purpose** Provide the ability to select an STL file as a stock for a turn or mill/turn part.

**Implementation** In the Manage Stock dialog box, an STL file can be selected for the stock definition for turn and mill/turn machines. This file will be used for toolpath computation and simulation.



### New – Turning Below Centerline

**Purpose** Generate turn toolpaths for conditions where the toolpath is below the centerline of the part.

**Implementation** By default CAMWorks generates toolpath above the turn centerline when machining with a Rear turret tool and below the turn centerline when machining with a Front turret tool. It is now possible to machine the opposite side of the turn centerline by selecting from the newly supported holder orientations and enabling the *Mirror about centerline* option on the on the Face Rough, Face Finish, Turn Rough, Finish Rough, Rough Groove, Finish Groove, Bore Rough, Bore Finish, Thread and Cutoff tabs. When selecting *Mirror about centerline*, the feature geometry is effectively mirrored about the turn centerline.

### Improved – Turret Definition for Post Operations

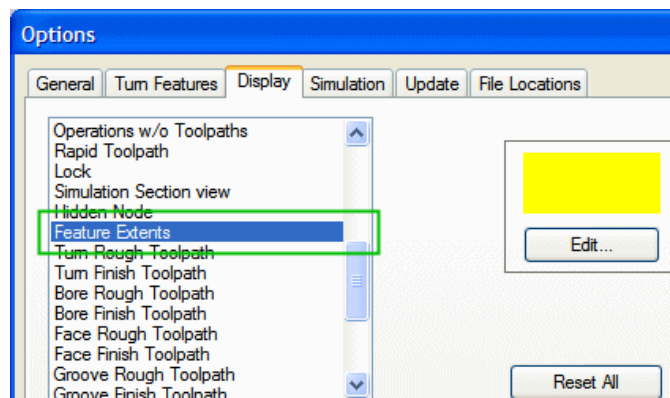
**Purpose** Support the definition of which turret a Post Processor operation is to be included.

**Implementation** When the machine type is Turn or Mill/Turn and the machine definition is for two turrets, the *Turret* option in the Insert Post Operation dialog box allows you to specify whether the post operation is associated to the front or rear turret.

### Improved – Turn Feature Extents

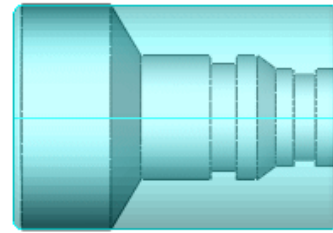
**Purpose** Provide the ability to set the color for Turn feature extents.

**Implementation** The color is defined on the Display tab in the CAMWorks Options dialog box.



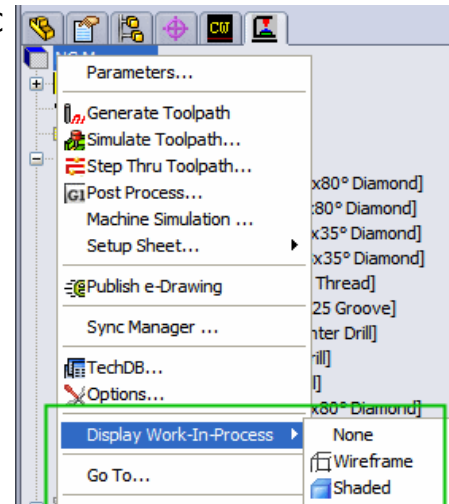
**Improved – Turn 3D Stock Display**

**Purpose** Display Turn stock as a 3D transparent shape.  
**Implementation** Done automatically.



**Improved – Turn WIP Display**

**Purpose** Provide the ability to set the WIP display as shaded.  
**Implementation** The Display Work-In-Process command on the NC Manager shortcut menu now has a drop down menu with selections for None, Wireframe and Shaded.



**Improved – Single Pass for Groove Cycles**

**Purpose** Enable the toolpath to for Rough and Finish Groove operations to make a single cut down the middle of the groove.  
**Implementation** When a groove tool is the same width as the groove feature a single cut is made down the center of the groove feature.

**Improved – Identification of Active Tool Turret**

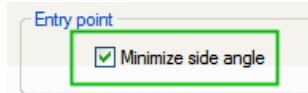
**Purpose** Provide faster identification of which turret is being used for the current operation.  
**Implementation** For Turn and Mill-Turn, Operation items in the Operation tree now include [Front] or [Rear].

## Wire EDM

### **Improved – Entry/Retract for 4 Axis Toolpaths**

**Purpose** Provide an option to observe both the lower and upper curve entry location for 4 axis Wire EDM toolpaths.

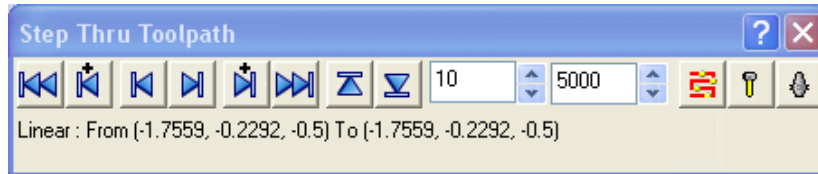
**Implementation** CAMWorks provides the ability to define an entry location on both the lower and upper curves of a 4 axis toolpath. However, by default CAMWorks attempts to limit the side tilt angle of the wire during leadin and leadout by observing one of the locations and automatically computing the other. In cases where it is desired to observe both the lower and upper entry point, you can disable the *Minimize side angle* option on the Leadin/Out tab.



## Simulation / Step Thru Toolpath / Edit Toolpath

### Improved – Toolbars Revised for Consistency

- Purpose** Provide a similar interface for Simulation, Step Thru Toolpath and Edit Toolpath toolbars.
- Implementation** Toolbar buttons are the same for Simulation, Step Thru Toolpath and Edit Toolpath. The figure below shows the Step Thru Toolpath toolbar.



### New – Vericut Interface

- Purpose** Develop an interface between CAMWorks Mill and Vericut Machine Simulation.
- Implementation** The Vericut program is a separate 3rd party software product, developed by CGTech in Irvine, California, that is used to simulate full machine animation based on CNC G-code.

### Improved – Simulation

- Purpose** Provide an option to automatically adjust target part deviation to reduce the system memory required to simulate large parts.
- Implementation** System memory requirements increase as the target part deviation decreases. On large models where the target part deviation is very small, it is possible to run out of system memory causing CAMWorks to terminate with insufficient memory. The *Use memory safe limits* option on the Simulation tab in the CAMWorks Options dialog box analyzes the model and modifies the minimum and maximum values based on the model size. By increasing the allowed minimum target part deviation, system memory requirements are also decreased, thereby reducing the occurrence of out of memory conditions.



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## Technology Database

### ***New* – Implement Area Roughing in 5 Axis**

- Purpose** Modify the TechDB to support setting defaults for the Area Roughing options in Multiaxis Mill operations.
- Implementation** Defaults for the options in the Area Roughing dialog box can now be set in the TechDB.

### ***New* – SQL Server Support for TechDB**

- Purpose** Support SQL Server 2005 as a database.
- Implementation** Access forms can connect to SQL Server 2005 or SQL Server 2005 Express on the backend thereby providing client-server support.

## Posting

Post customization is required in order to use new commands and variables. These commands and variables are not supported in previous versions of CAMWorks or in any ProCAM product.

### **New – Variables**

#### **TLP\_FEAT\_SETUP\_NAME**

Type CHARACTER

Usage This variable stores the setup name for the current toolpath feature. Available in Mill, Turn and Mill/Turn.

#### **SYNC\_CODE\_COMMENT**

Type CHARACTER

Usage This variable stores the sync code comment. Available in Turn and Mill/Turn. These variables are set in CW2010, however the option of syncing turrets is not implemented in CW2010.

#### **REAR\_SYNC\_CODE**

#### **P\_REAR\_SYNC\_CODE**

Type INTEGER

Usage This variable stores the current and previous rear turret sync code number. Available in Turn and Mill/Turn. These variables are set in CW2010; however the option of syncing turrets is not implemented in CW2010.

#### **REAR\_SYNC\_CODE\_TYPE**

Type INTEGER

Usage This variable stores the rear turret sync code type. Available in Turn and Mill/Turn. These variables are set in CW2010; however the option of syncing turrets is not implemented in CW2010.

```
REAR_SYNC_CODE_TYPE= SYNC_CODE_UNKNOWN
REAR_SYNC_CODE_TYPE= SYNC_CODE_BEFORE_START
REAR_SYNC_CODE_TYPE= SYNC_CODE_BEFORE_FIRST_MOVE
REAR_SYNC_CODE_TYPE= SYNC_CODE_AFTER_END
```

#### **FRONT\_SYNC\_CODE**

#### **P\_FRONT\_SYNC\_CODE**

Type INTEGER

Usage This variable stores the current and previous front turret sync code number. Available in Turn and Mill/Turn. These variables are set in CW2010; however the option of syncing turrets is not implemented in CW2010.

#### **FRONT\_SYNC\_CODE\_TYPE**

Type INTEGER

Usage This variable stores the rear turret sync code type. Available in Turn and Mill/Turn. These variables are set in CW2010; however the option of syncing turrets is not implemented in CW2010.

```
FRONT_SYNC_CODE_TYPE= SYNC_CODE_UNKNOWN
FRONT_SYNC_CODE_TYPE= SYNC_CODE_BEFORE_START
FRONT_SYNC_CODE_TYPE= SYNC_CODE_BEFORE_FIRST_MOVE
FRONT_SYNC_CODE_TYPE= SYNC_CODE_AFTER_END
```

```
SYNC_CODE_UNKNOWN = 0
SYNC_CODE_BEFORE_START = 1
SYNC_CODE_BEFORE_FIRST_MOVE = 2
SYNC_CODE_AFTER_END = 3
```

**ARC\_NORM\_X**  
**P\_ARC\_NORM\_X**  
**N\_ARC\_NORM\_X**

Type DECIMAL

Usage This variable stores the current, previous and next X axis arc normal vector. Available in Mill, Turn and Mill/Turn.

**ARC\_NORM\_Y**  
**P\_ARC\_NORM\_Y**  
**N\_ARC\_NORM\_Y**

Type DECIMAL

Usage This variable stores the current, previous and next Y axis arc normal vector. Available in Mill, Turn and Mill/Turn.

**ARC\_NORM\_Z**  
**P\_ARC\_NORM\_Z**  
**N\_ARC\_NORM\_Z**

Type DECIMAL

Usage This variable stores the current, previous and next Z axis arc normal vector. Available in Mill, Turn and Mill/Turn.

### ***New* – Post System Calc Sections**

#### **CALC\_ADD\_REAR\_SYNC\_CODE**

CALC\_ADD\_REAR\_SYNC\_CODE gets called when a command to output rear sync code is encountered and the post variables SYNC\_CODE\_COMMENT, REAR\_SYNC\_CODE and REAR\_SYNC\_CODE\_TYPE are set.

#### **CALC\_ADD\_FRONT\_SYNC\_CODE**

CALC\_ADD\_FRONT\_SYNC\_CODE gets called when a command to output front sync code is encountered and the post variables SYNC\_CODE\_COMMENT, FRONT\_SYNC\_CODE and FRONT\_SYNC\_CODE\_TYPE are set.