What's New in SolidCAM 2016

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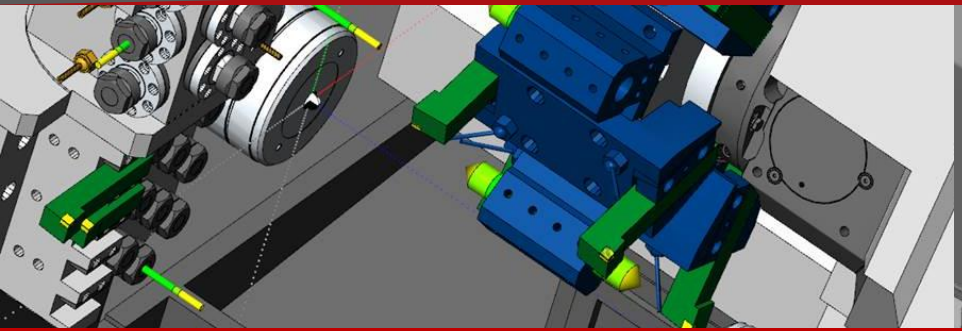
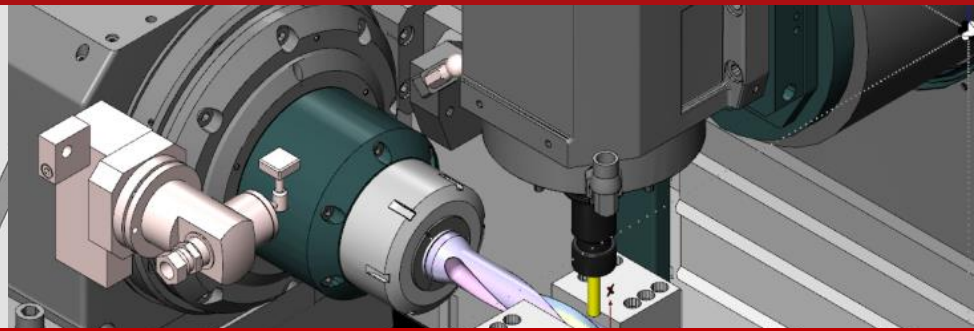
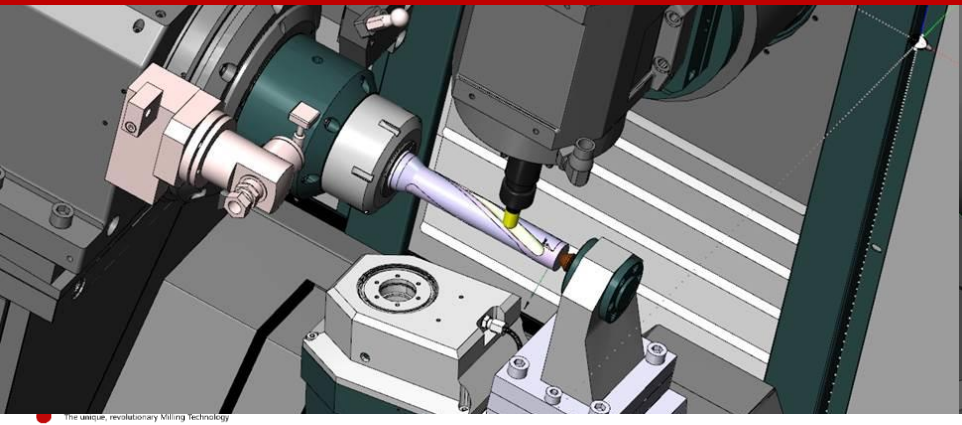
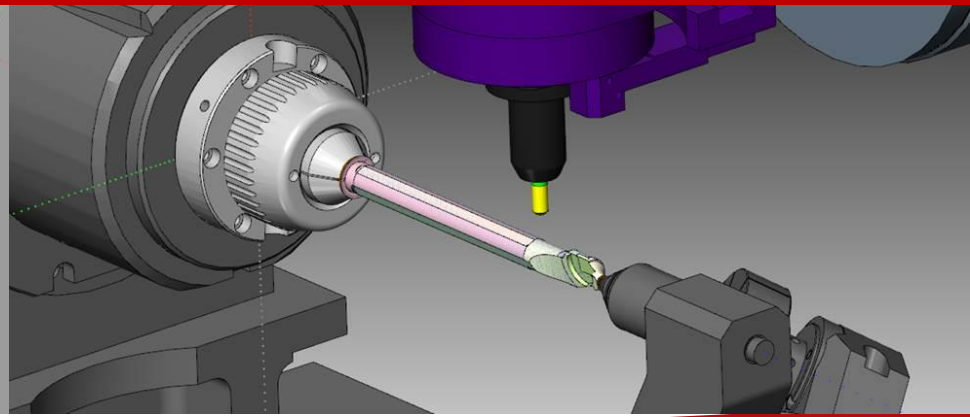


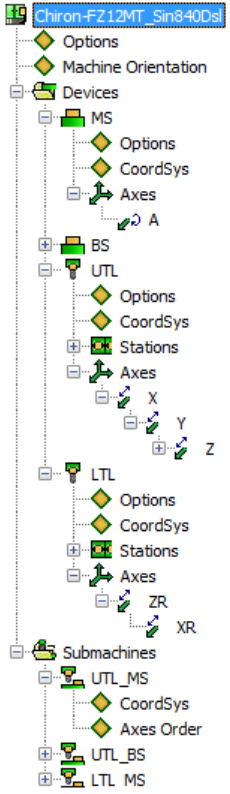


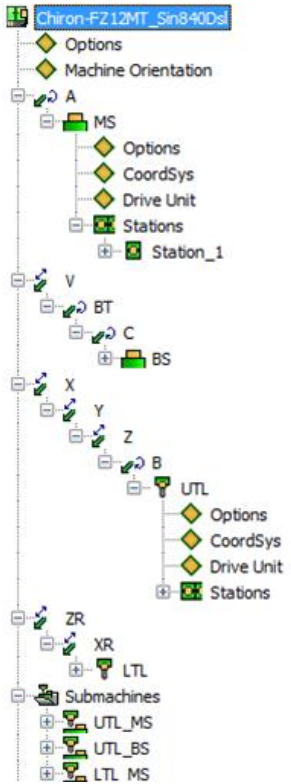
SolidCAM2016: Advanced Mill-turn solution





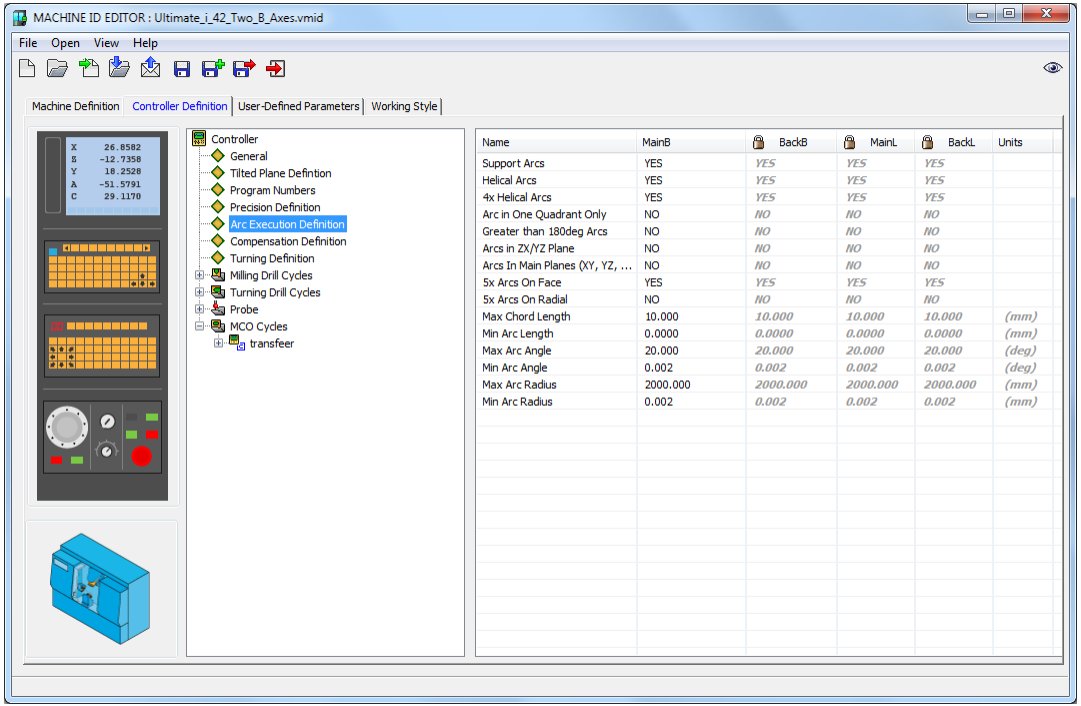
VMID (Virtual Machine ID) change : Devices on Axes





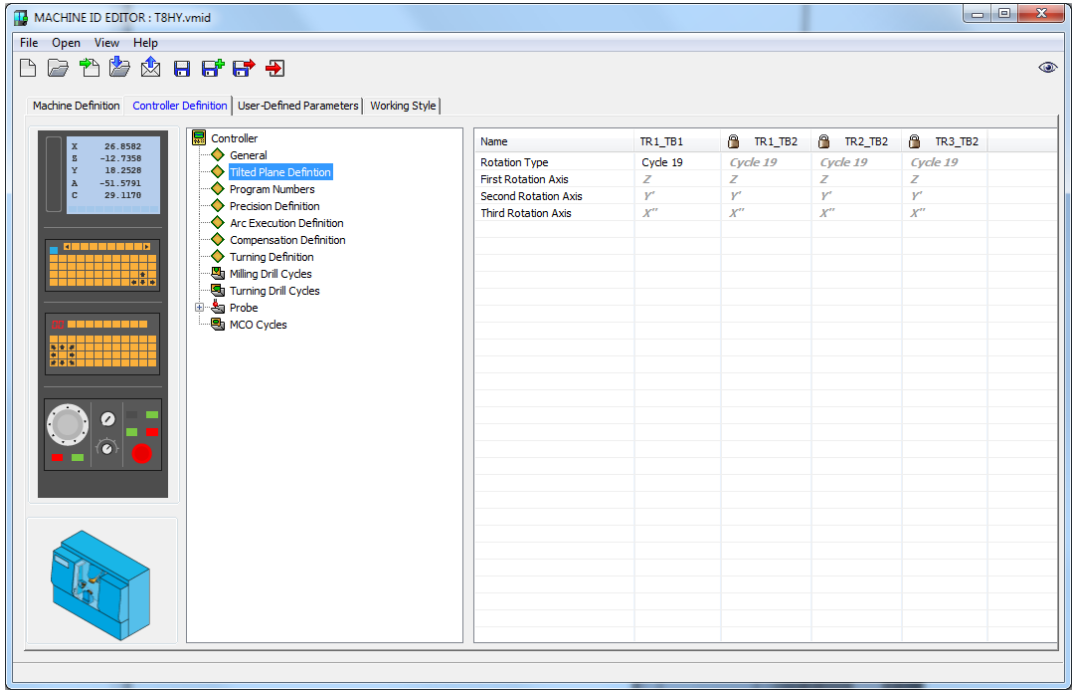
- **<u>Devices on Axes</u> (and not Axes on Devices): support of several devices mounted on the same axis**
- **<u>The VMID definition is now similar to the Machine Simulation structure</u>**

VMID (Virtual Machine ID) change : Separation of parameters by Submachines & Channels



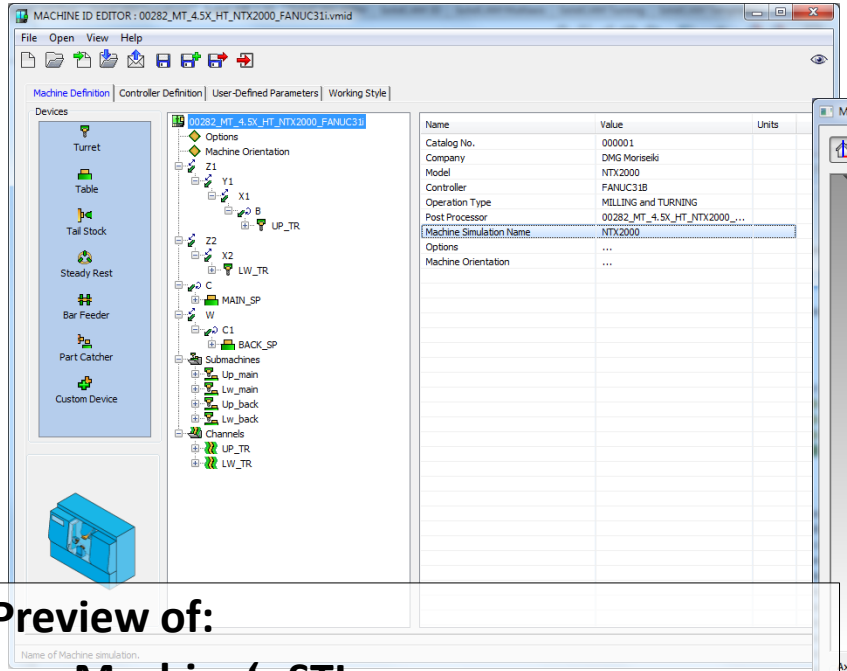
- **More <u>flexible definition of Controller parameters</u> : possibility to apply different values to parameters used in different Submachines & Channels**

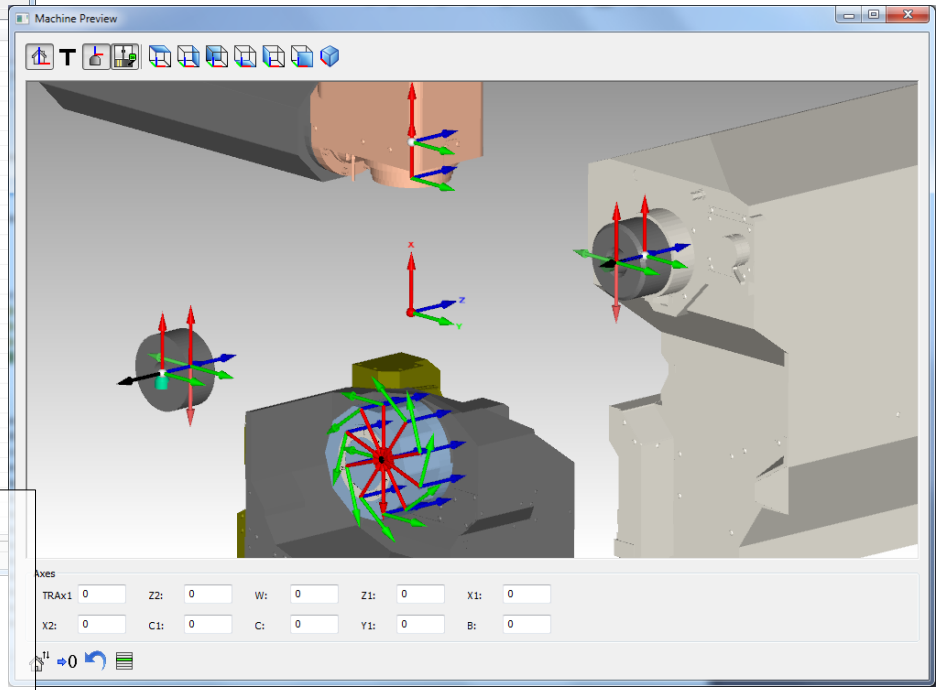
VMID (Virtual Machine ID) change : Tilted plane definition



- **Full control over coordinates calculation, in case when physical rotary axes are missing on the machine**

Interactive Machine Preview for VMID

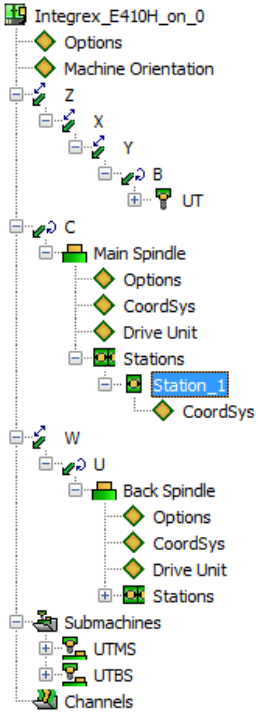


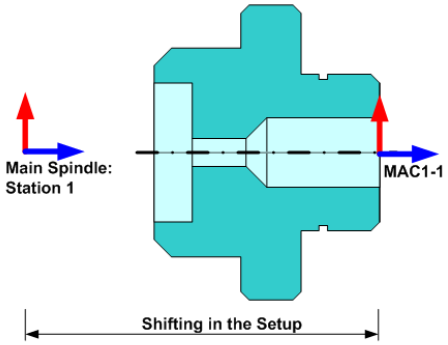


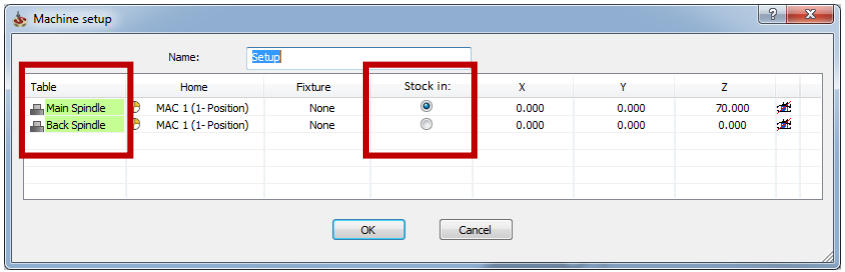
Preview of:

- **Machine's STLs**
- **Device/Stations CoordSys**
- **Kinematic axes**

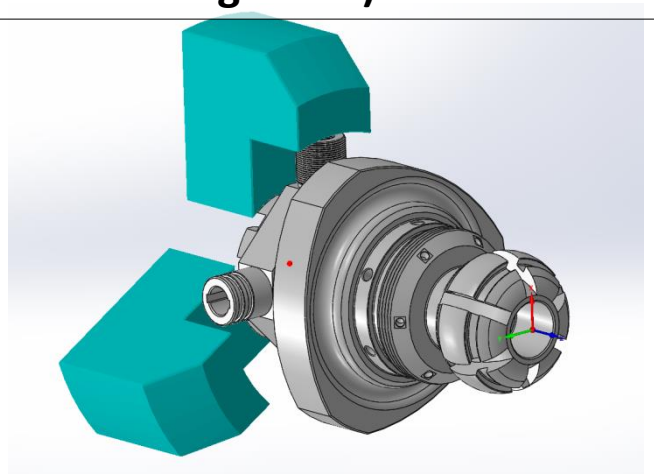
Stock positioning: Mounting the stock on the table



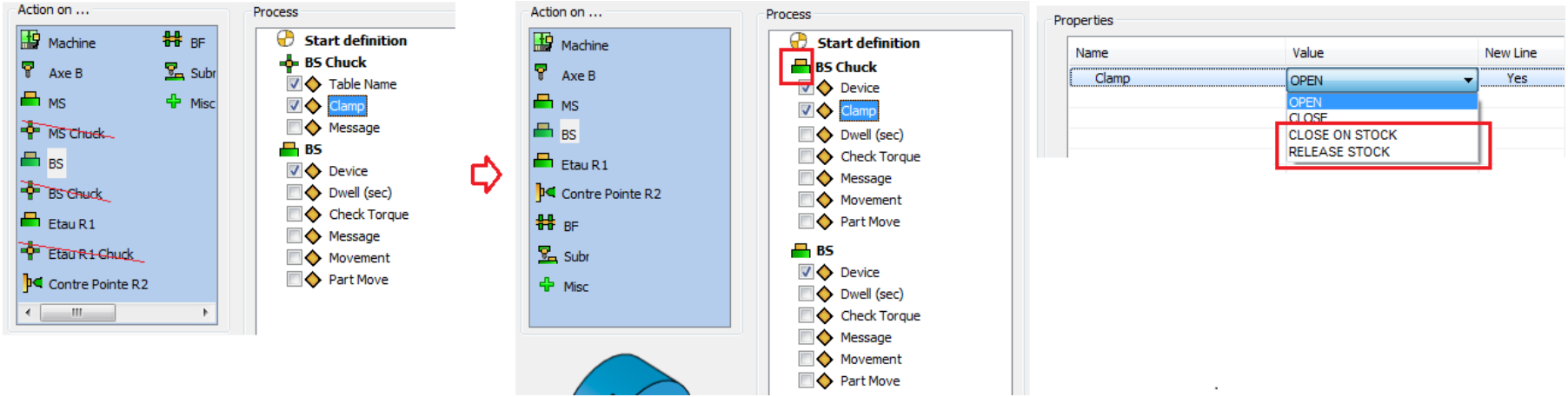




- **Stock is mounted on the table (instead of Submachine) – same as on the real machine**
- **Definition of initial stock position (on which Table the machining starts)**

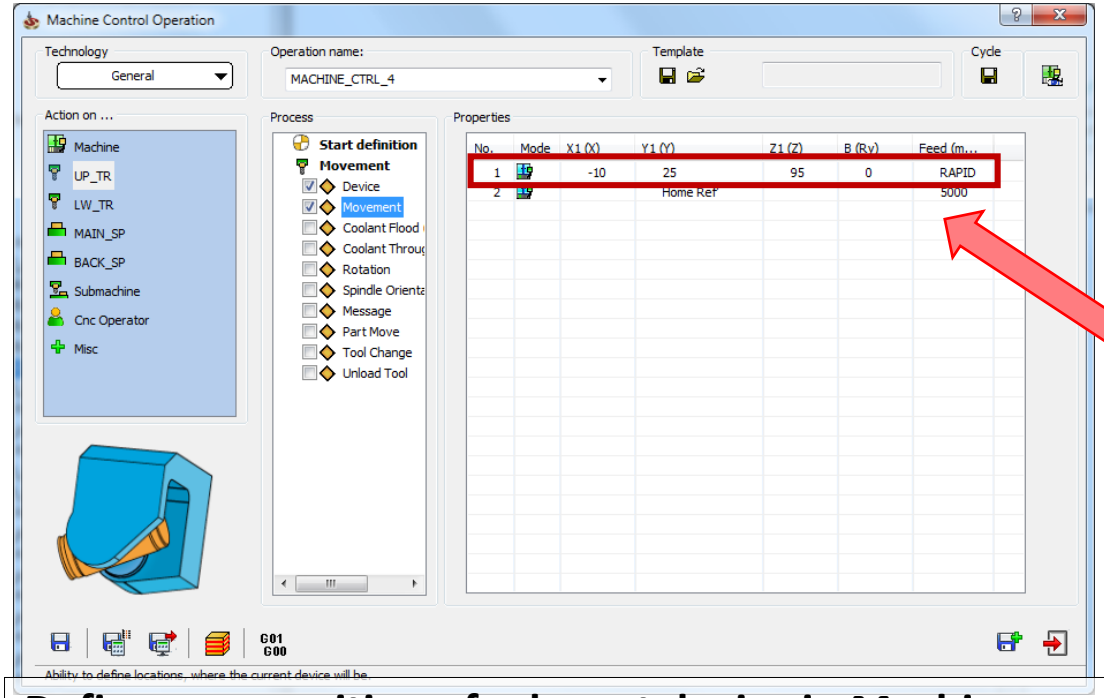


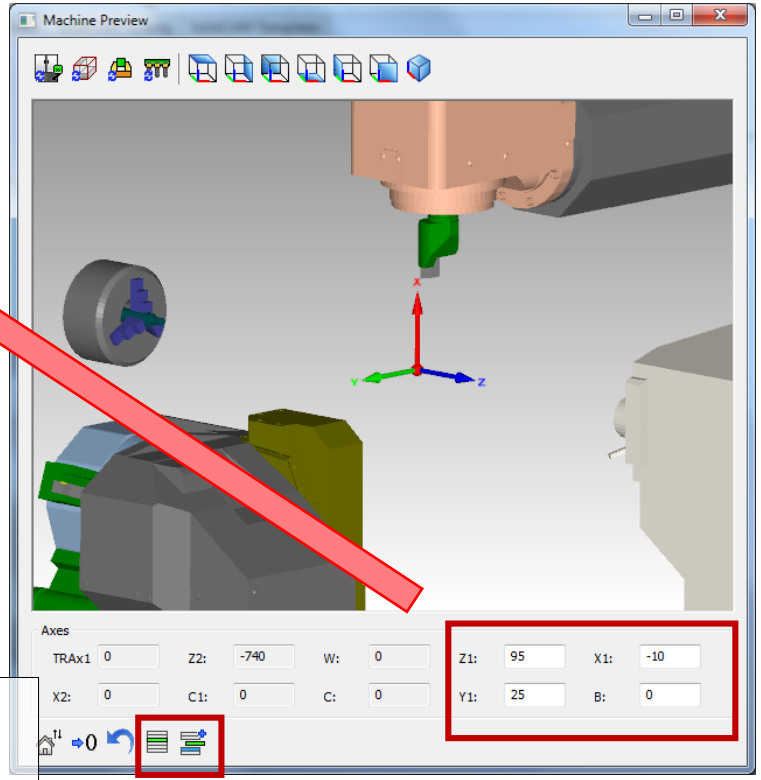
Tracking the stock position in the Machine: New Clamp options



- **The stock tracking is added in order to assist the programmer in definition of the CAM-Part movements**
- **Chuck device is moved to the Table as “Clamp“ action, with 2 additional options:**
  - **“Close on stock“ (connect stock to this table)**
  - **“Release stock“ (when machining is complete – stock is removed from the machine)**

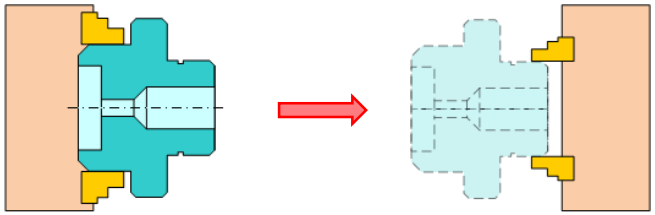
Interactive Machine Preview for MCO

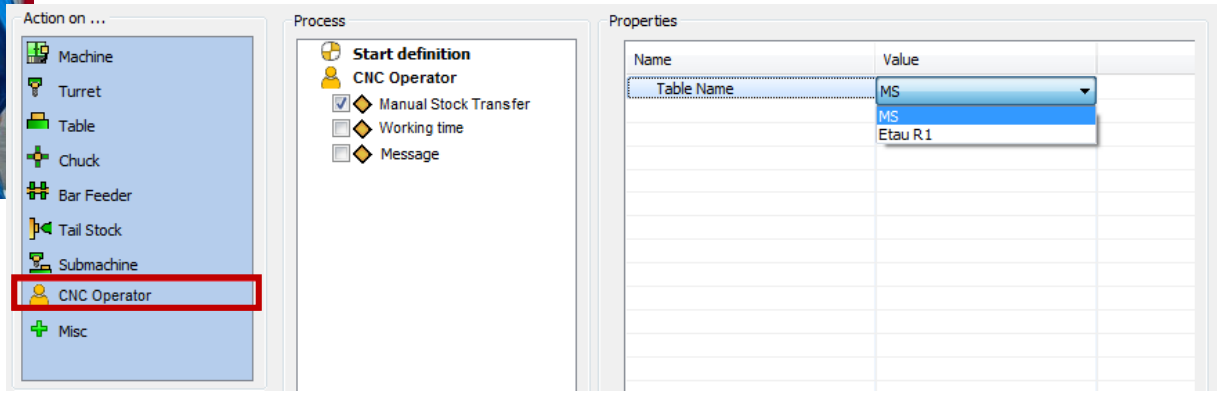




Define axes position of relevant device in Machine preview → import the position to the Movements list

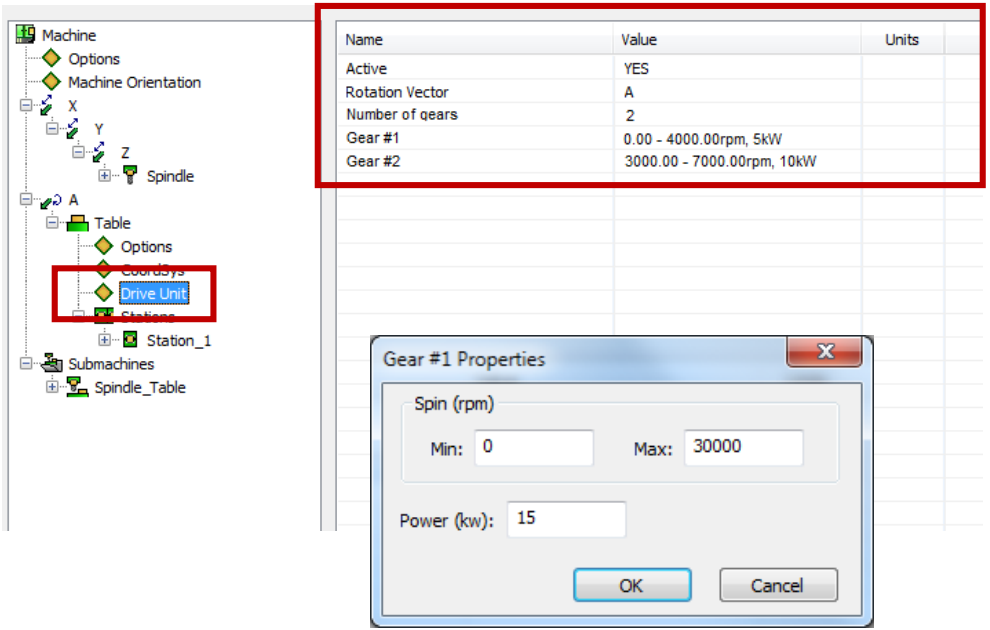
Action by CNC Operator: new MCO “device”

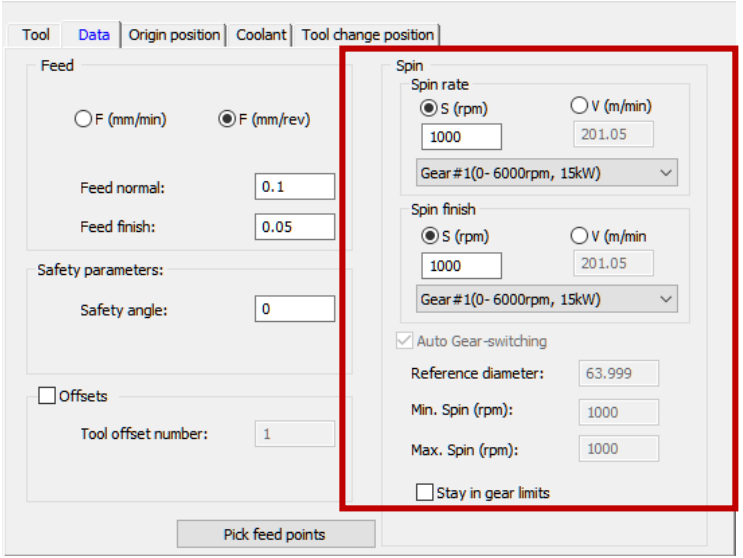




- **Any action of CNC Operator can be taken into account in machining time calculation**
- **Manual Stock Transfer from table to table option**

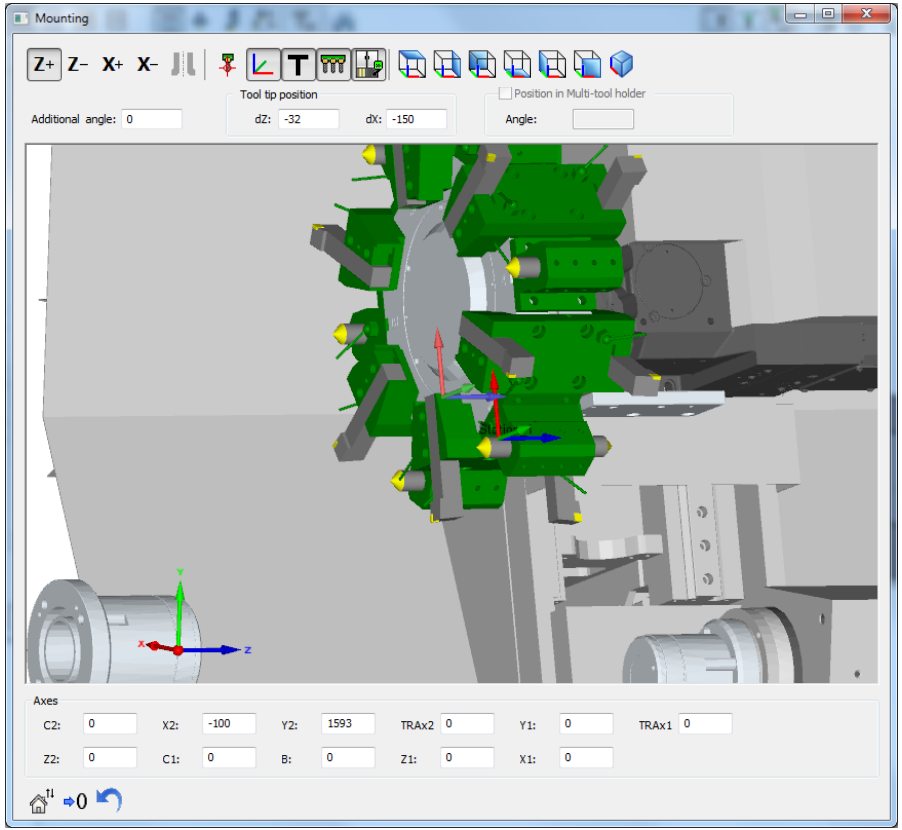
Drive units : Improvement in Spin definition





- **Support of several Gears on the same device = spin definition as on real machine**
- **Automatic selection of the Gear according to the Spin defined**

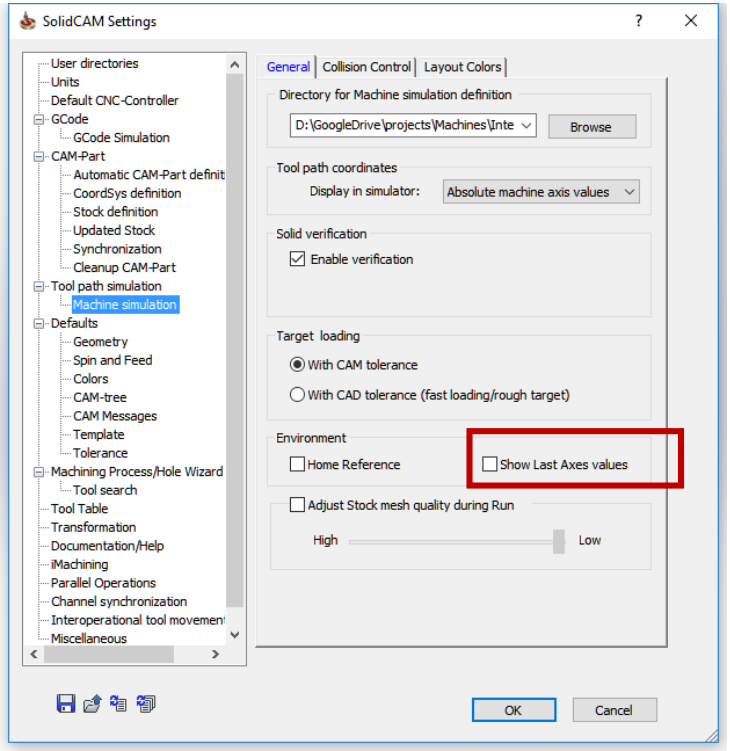
Interactive Machine Preview for Tooltable

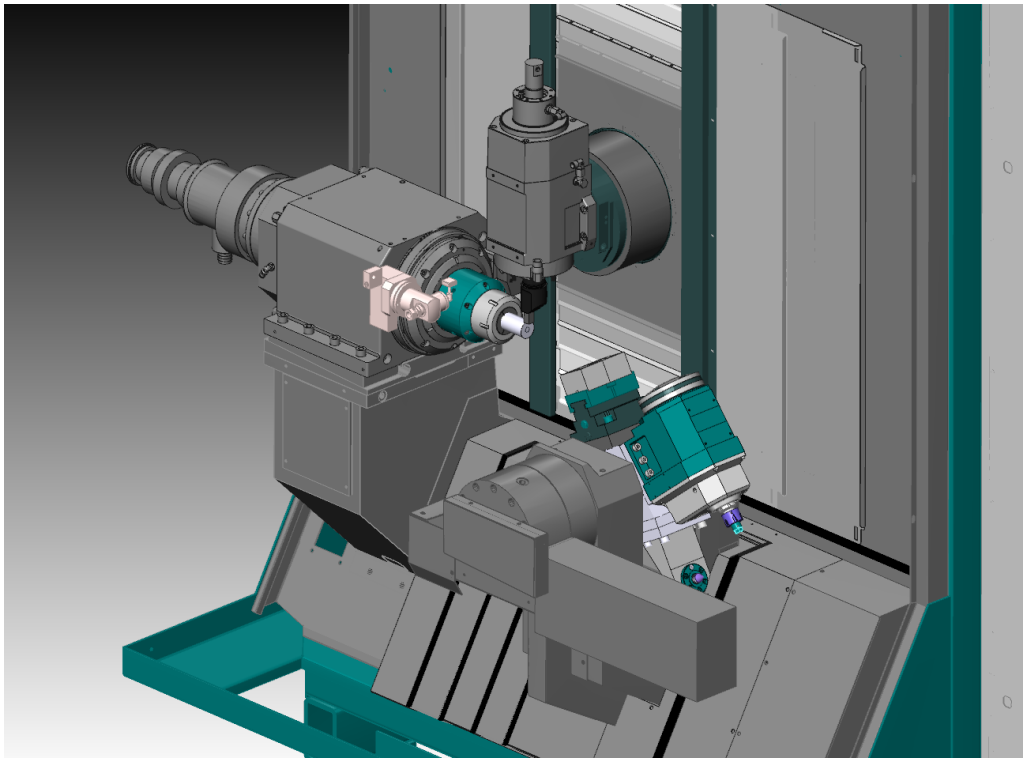


New Mounting interface:

- **Possibility to see other tools mounted on the same turret**
- **Preview of machine (if Machine model for Machine simulation is defined)**
- **Contol over machine axes position – for better mounting comprehension**

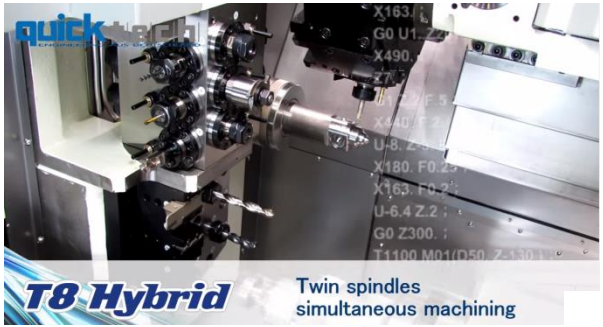
Machine Simulation : Show actual axes positions





No need anymore to select previous MCOs in order to launch MachSim on selected operation

Result: Extended support of complex mill-turn CNC machines

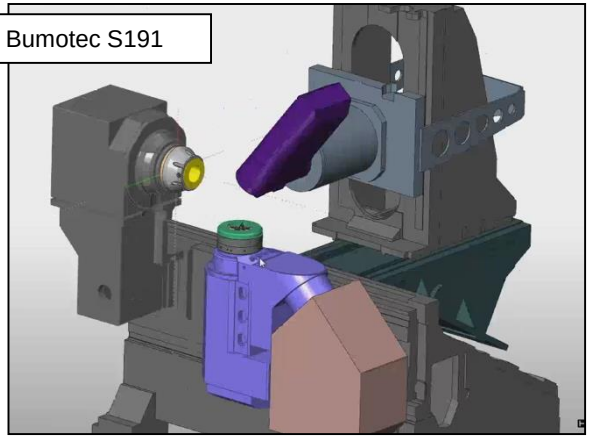


Extended support of complex mill-turn machines in all stages:

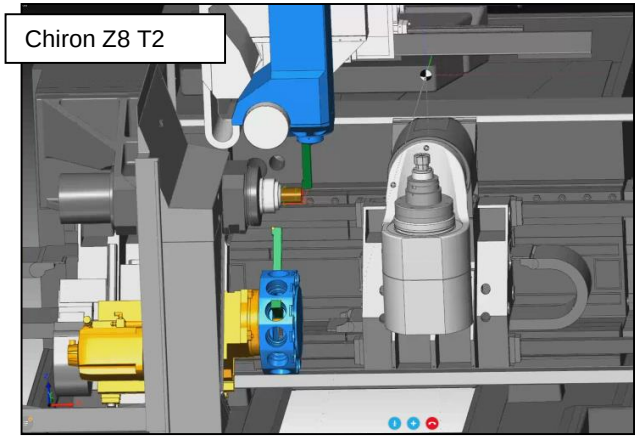
- **Virtual machine (*.VMID) definition**
- **Tool mounting**
- **CAM-part programming**
- **Machine Simulation**
- **G-code generation**

Extended support of complex mill-turn CNC machines

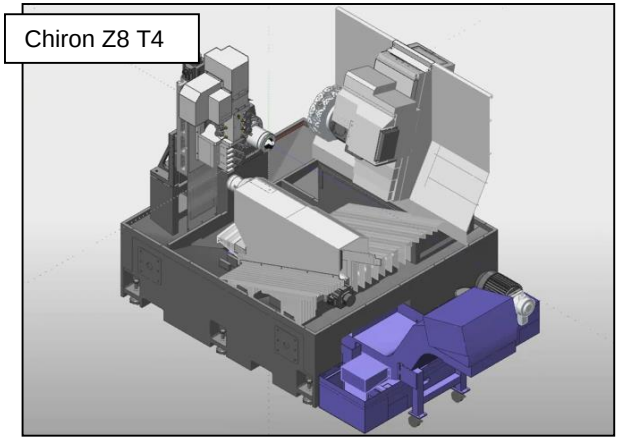
Bumotec S191



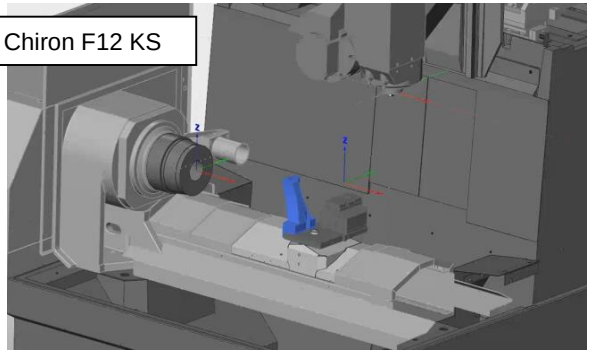
Chiron Z8 T2



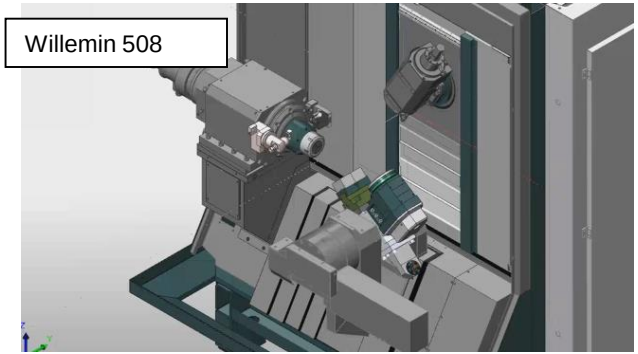
Chiron Z8 T4



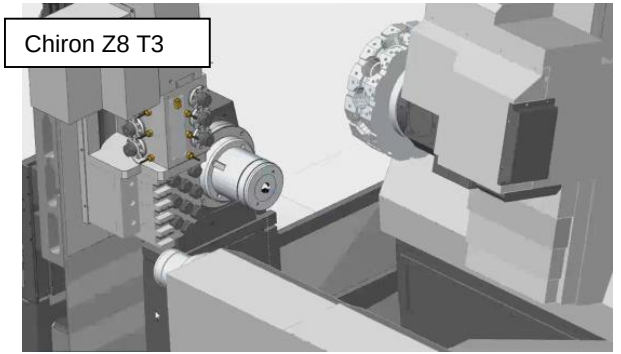
Chiron F12 KS



Willemin 508

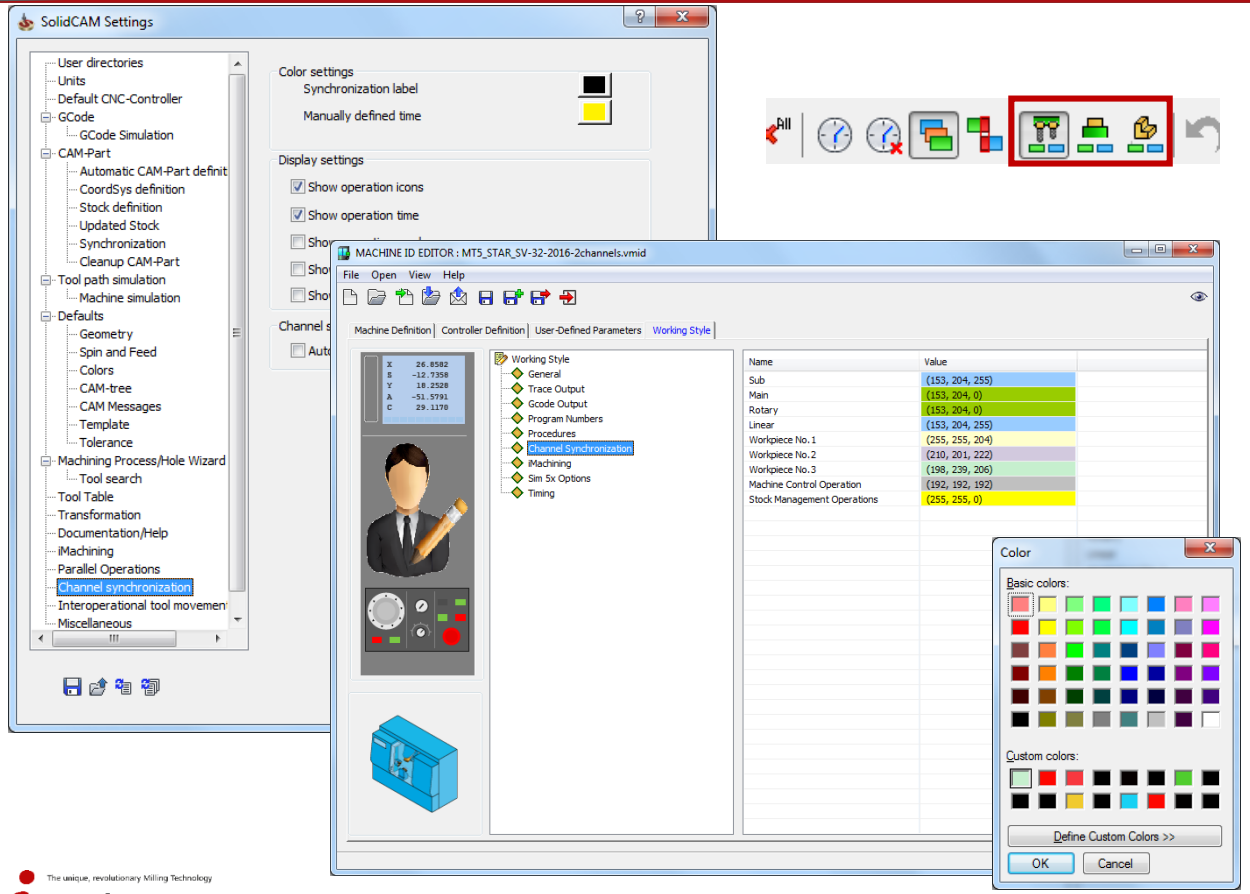


Chiron Z8 T3



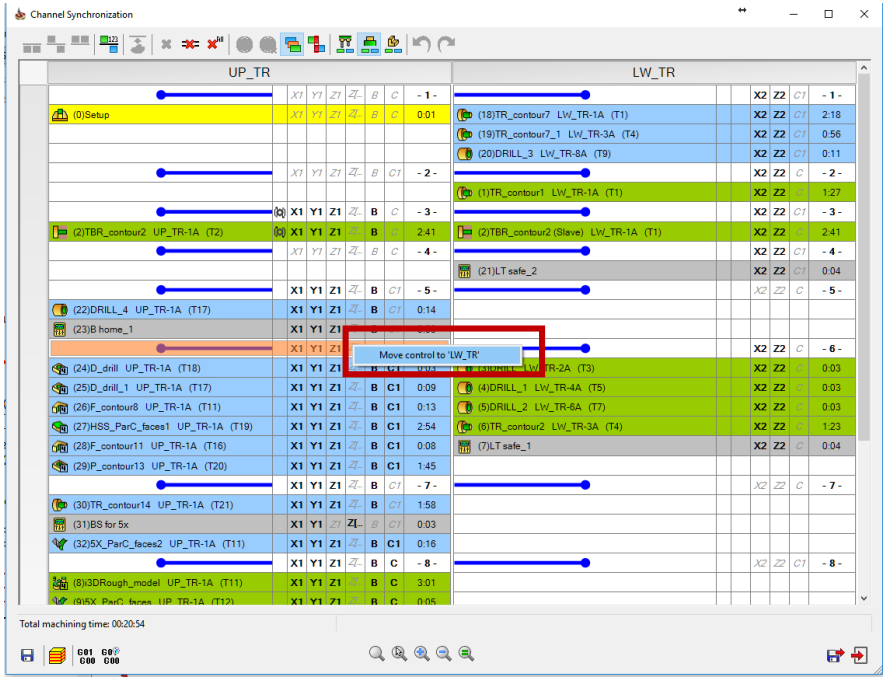
Channel Synchronization

Channels Synchronization : Colors definition in Machine ID file (*.VMID)



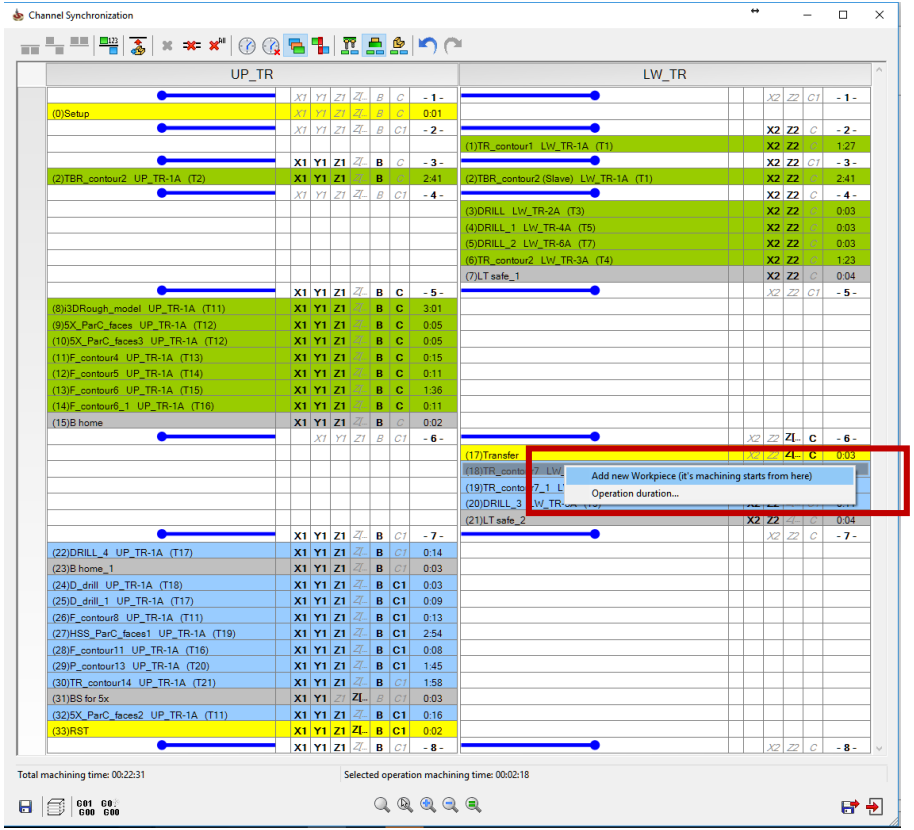
- **Operation in Channel Synchronization manager could be colored by Table, by Turret and by Workpiece**
- **Colors of table, turret, workpiece and various stock management operations are set in *.VMID file**
- **Colors of Label and of the cell in case of manual operation duration definition is set in SolidCAM settings**

Channels Synchronization : Axes transfer from channel to channel



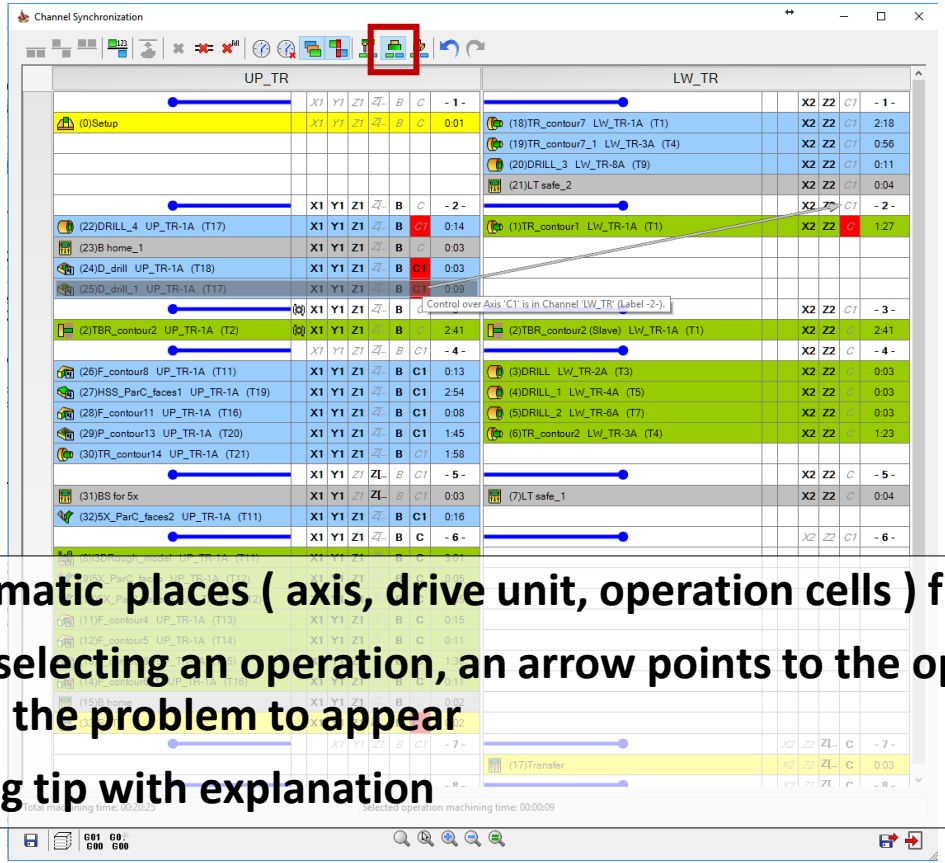
- **Right click on non-kinematic (gray italic) Axis in Synchronization Label allows to transfer control over this axis to another channel**

Channels Synchronization : Continuous production



- **<u>Add New Workpiece</u> to define multistock work process and provide synchronization between operations**
- **Possibility to emulate the machining of several workpieces on different tables simultaneously**

Channels Synchronization : Clash reports visualization



- **Problematic places (axis, drive unit, operation cells) filled by red color**
- **When selecting an operation, an arrow points to the operation/axis/drive unit that caused the problem to appear**
- **Floating tip with explanation**

Channels Synchronization : Functional toolbar improvement

Redo

Undo

Color operations by Workpiece

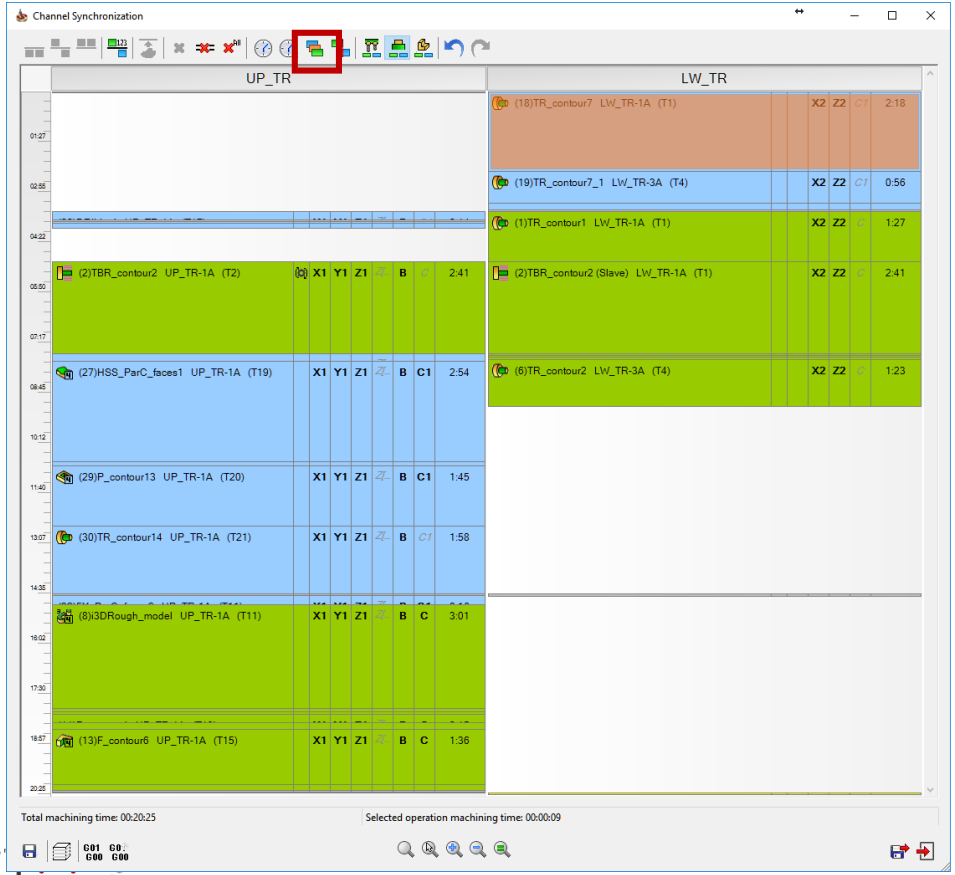
Color operations by Table

Color operations by Turret

Delete all labels, but keep the operations order

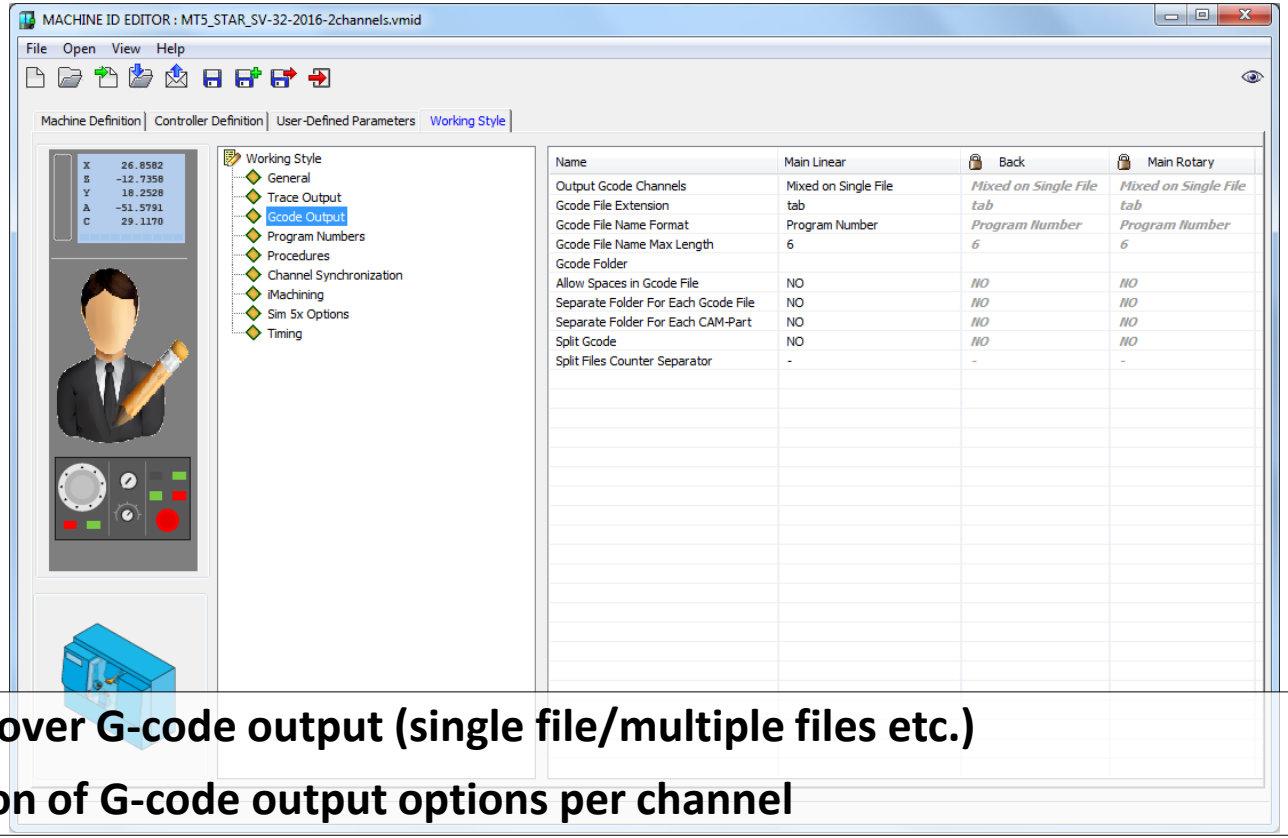
Add Workpiece (and start it‘s machining from the selected operation)

Channels Synchronization : Time mode



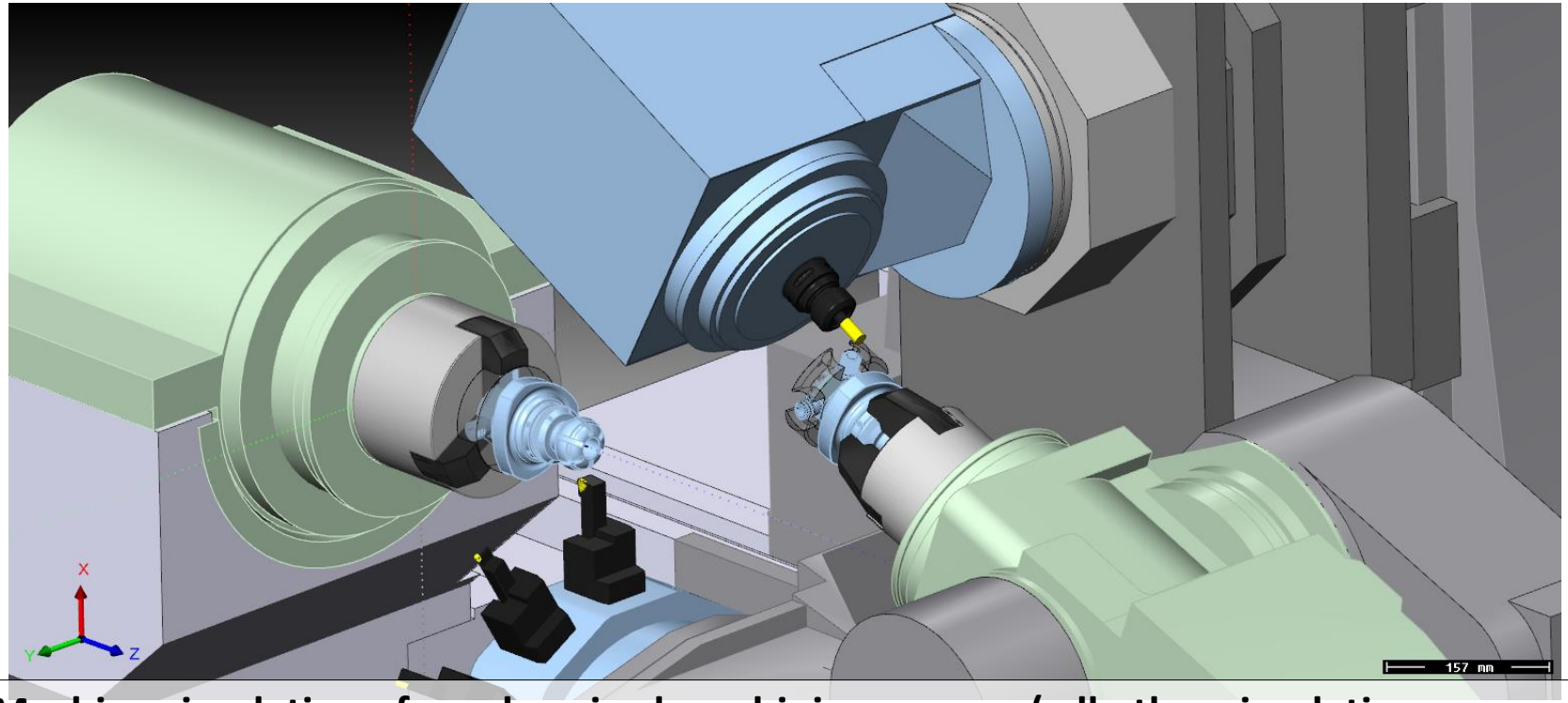
- **Preview of operations in real time mode**
- **Impossible to change synchronization labels and operations order – it‘s only preview mode**

Channels Synchronization : G-code



- **Control over G-code output (single file/multiple files etc.)**
- **Definition of G-code output options per channel**

Channels Synchronization : Machine Simulation

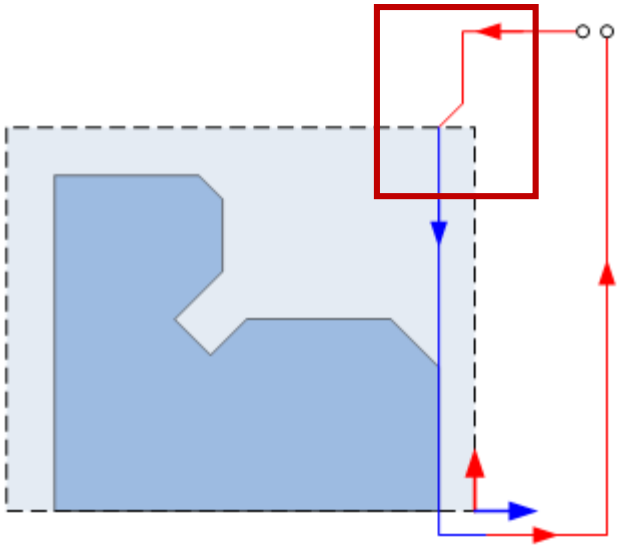


- **Machine simulation of synchronized machining process (all other simulations execute operations in CAM-tree order)**

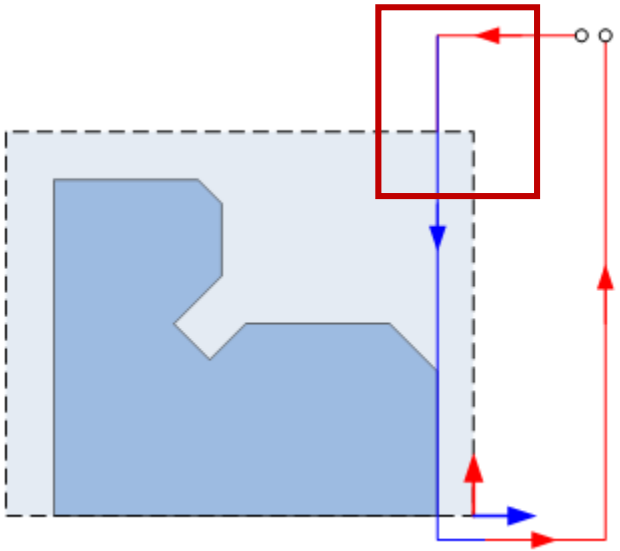
Turning

Turning: Changes in compensation

Previous versions

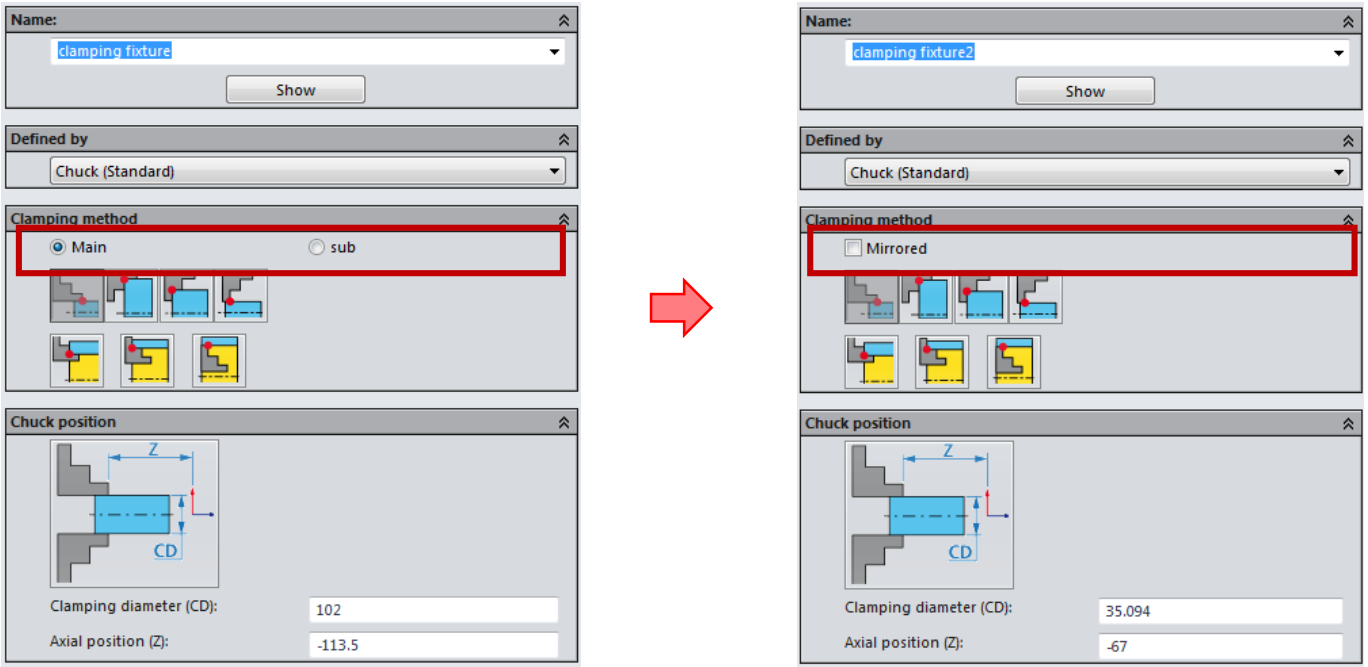


SolidCAM 2016



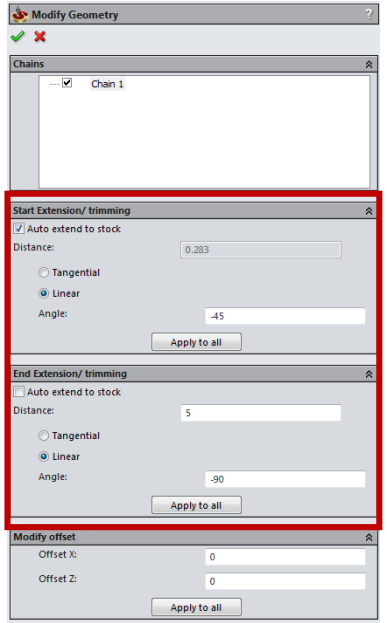
Optimized (less movements) entrance to compensation in turning operation

Turning: Standard Chuck definition

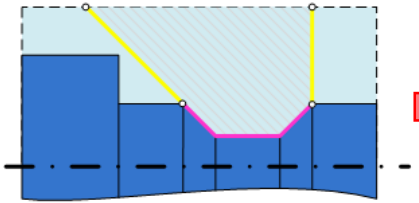


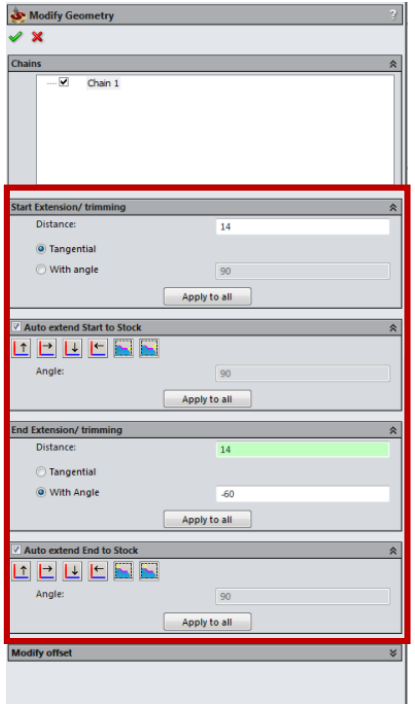
Change in interface defining the orientation of polyarc (radio buttons replaced by checkbox)

Geometry: Enhanced geometry extension options

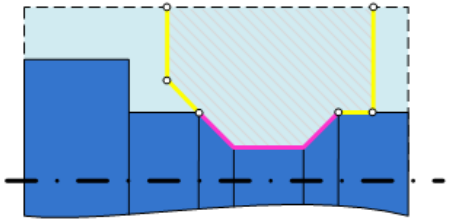


Previous versions



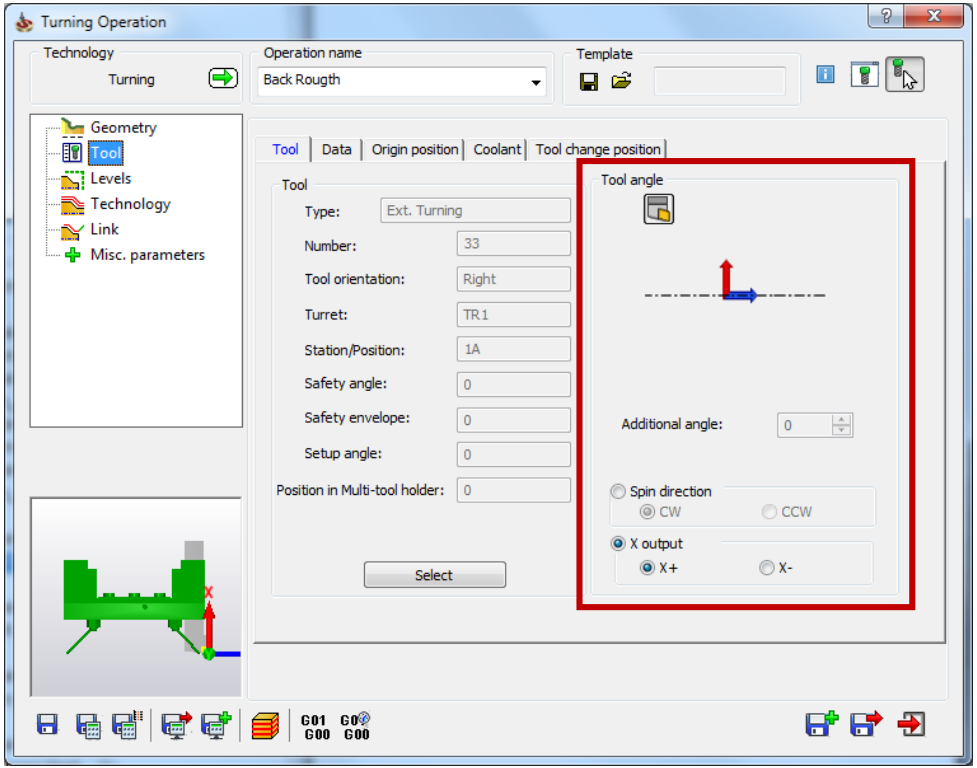


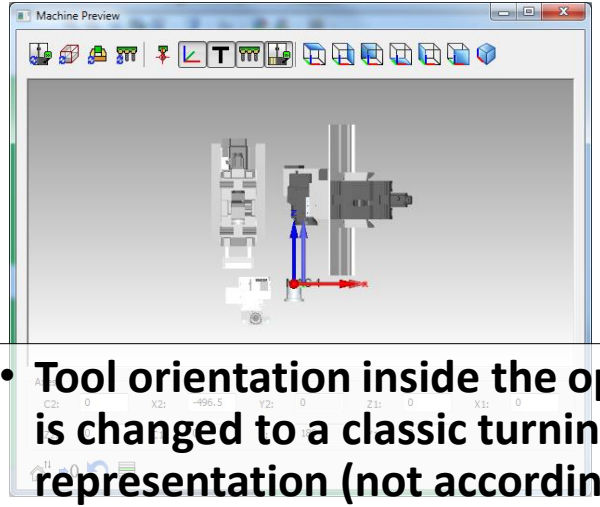
SolidCAM 2016



More flexible extension of the geometry by 2 segments on both sides of the polyarc

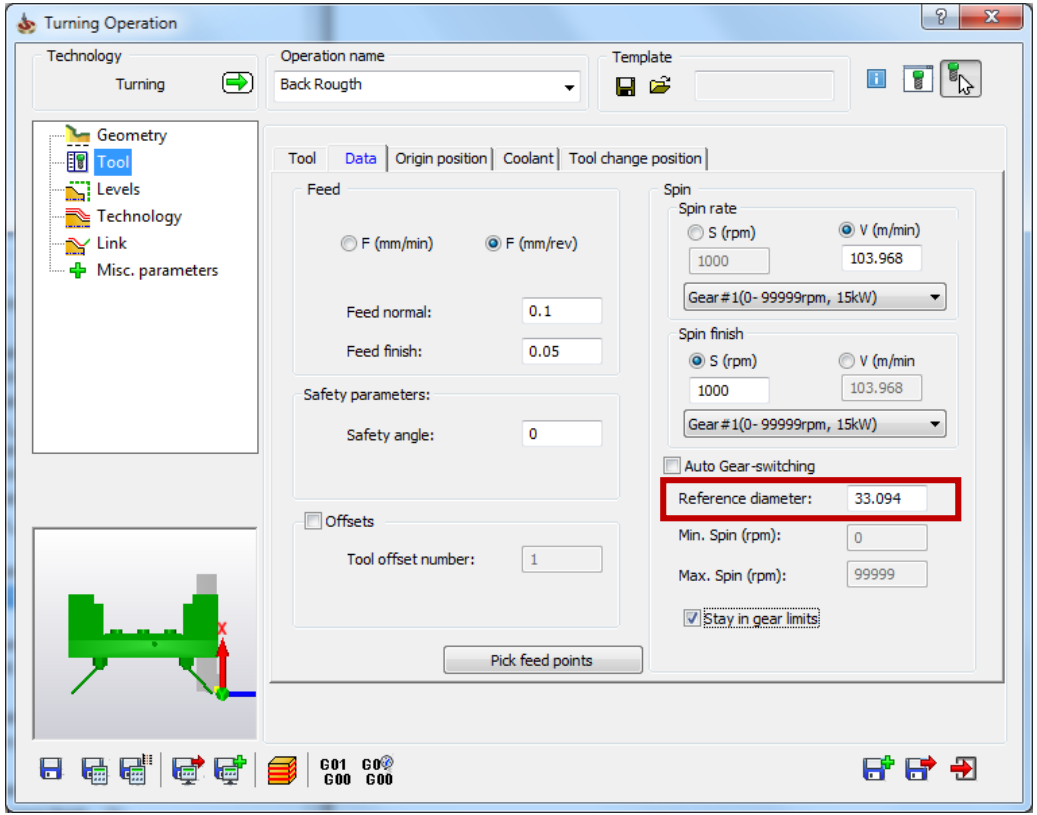
Turning: non-kinematic tool orientation definition inside the operation





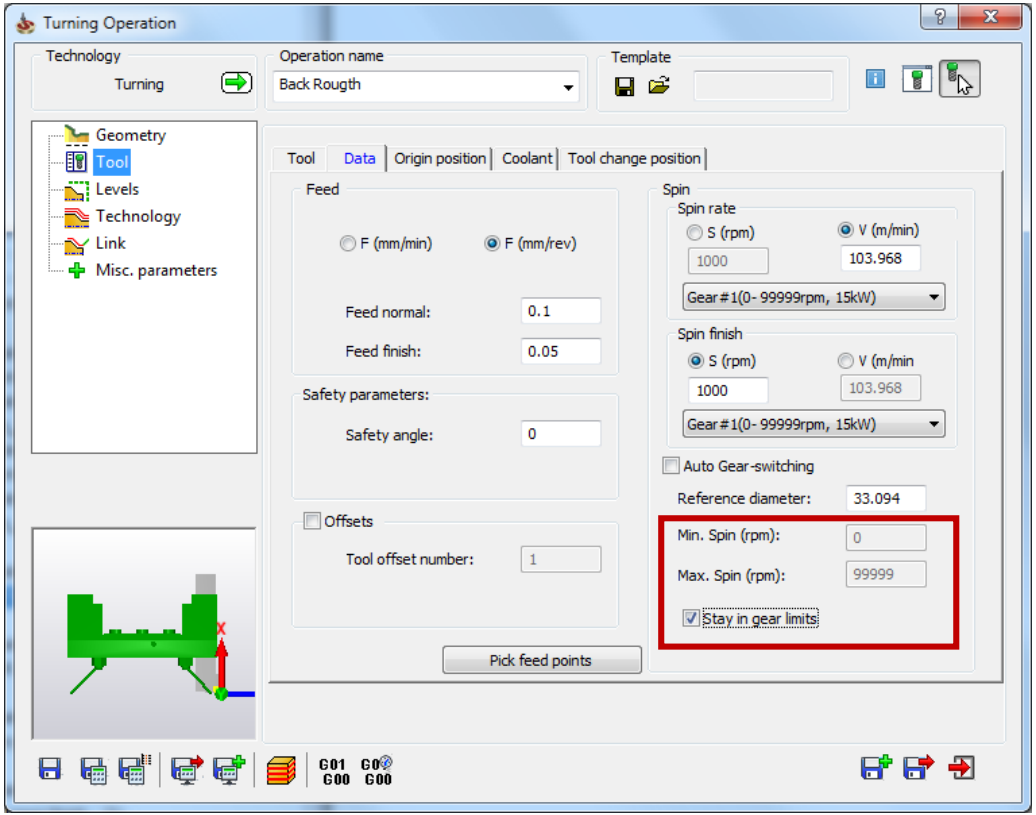
- **Tool orientation inside the operation is changed to a classic turning representation (not according to the actual tool position in the machine)**
- **Actual tool orientation is visualised in Machine Preview dialog available from within the Operation**
- **X output (+ or -) and Spin direction are now connected**

Turning: Reference diameter



- **For V (m/min) spin definition – reference diameter added.**
- **Spin for smaller/ larger diameter is calculated accordingly**

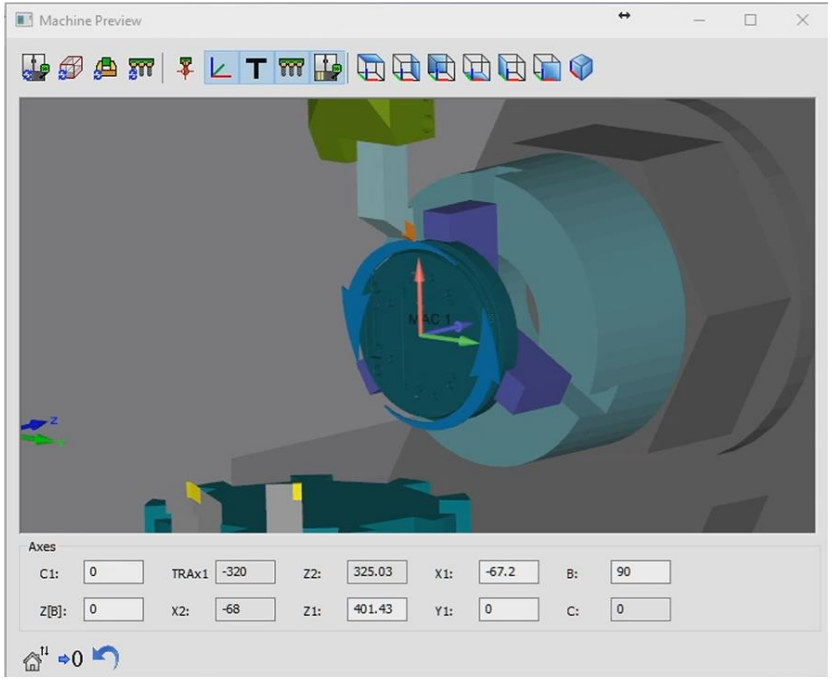
Turning: Stay in Gear limits



Two options to define spin limits:

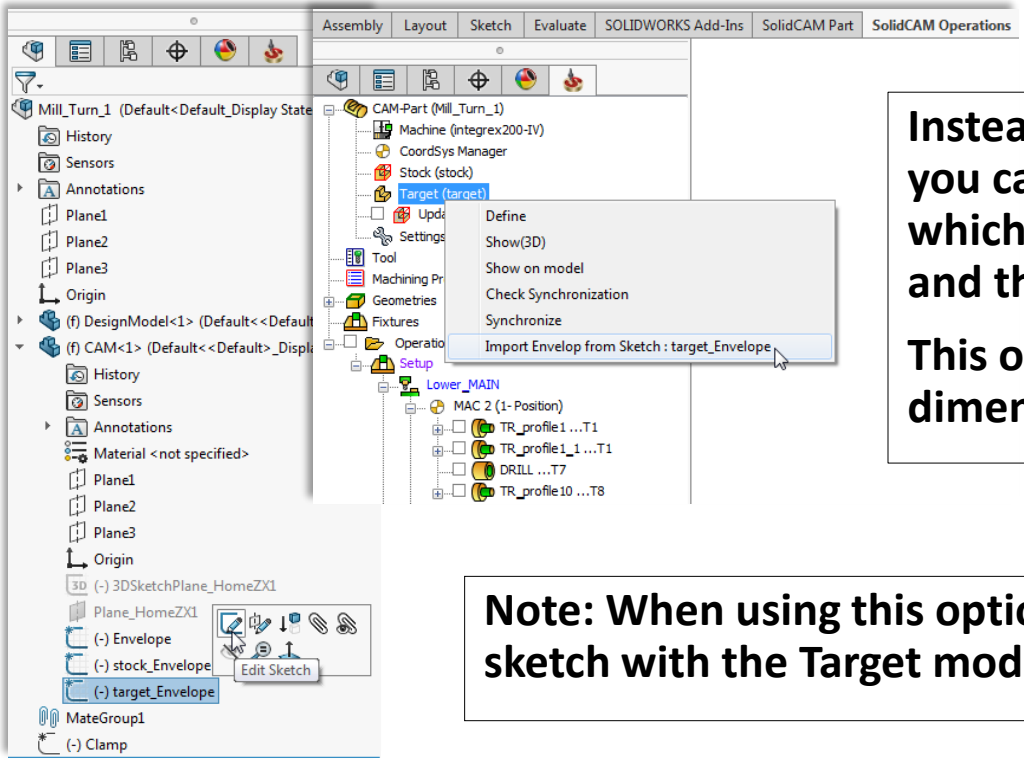
- **Take values from the selected Gear automatically**
- **Enter the values manually**

Turning: Spindle direction shown in Machine Preview



Spindle direction represented as blue arrow wrapped around spindle axis.

Turning: Import Envelope from Sketch



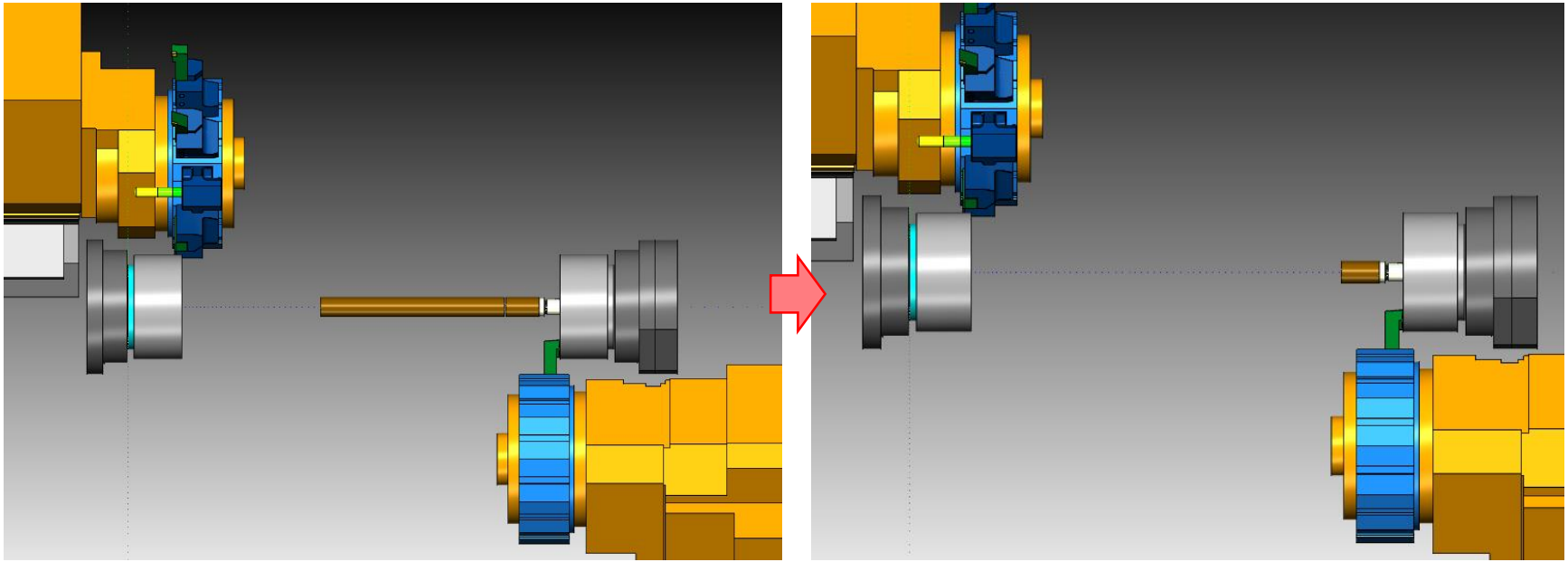
Instead of modifying your CAD model, you can modify the section sketch from which the target envelope is generated and then synchronize those changes.

This option is useful for tolerancing and dimensional changes.

Note: When using this option, associativity of the envelope sketch with the Target model is lost.

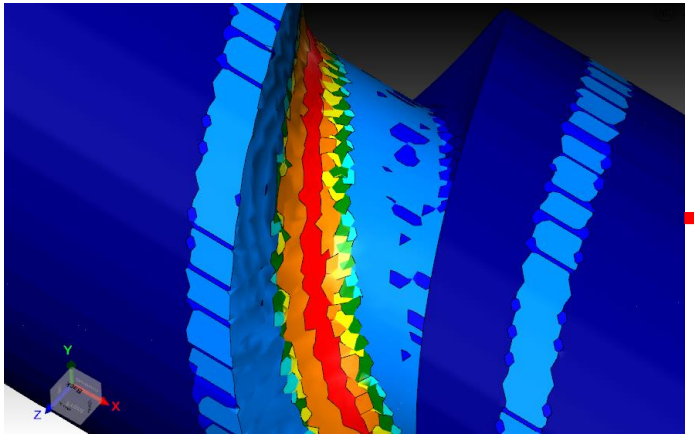
Machine Simulation

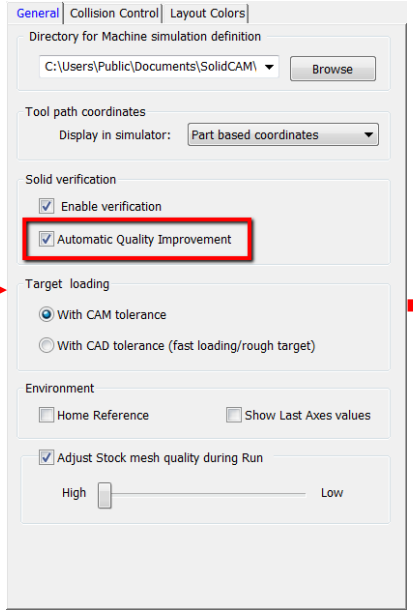
MachSim: Redundant stock after CutOff

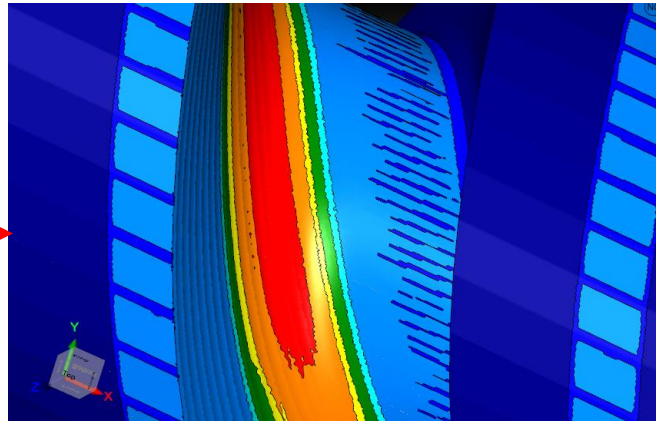


In new version the piece of stock remaining after the CutOff operation is deleted automatically or stays in previous table

MachSim: Automatic Quality Improvement





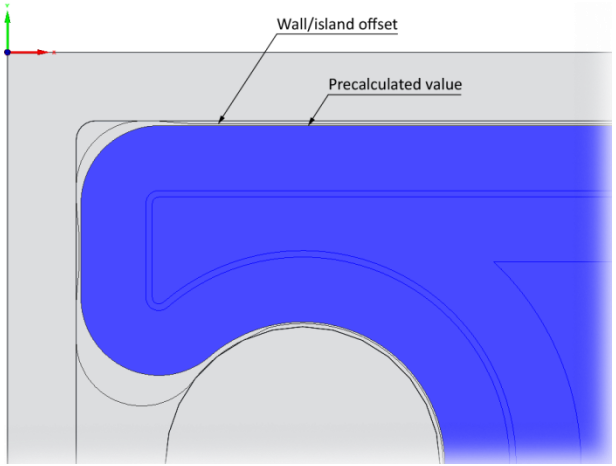


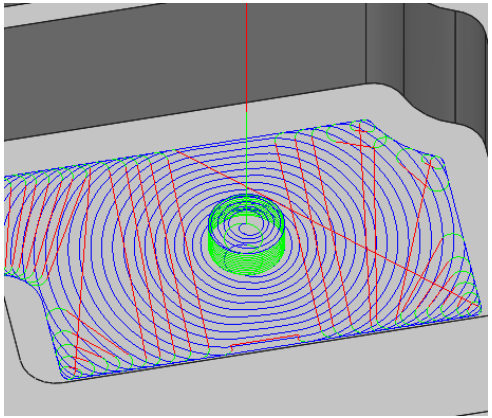
- **On the fly display refinement for realistic display of Cut Stock**
- **Works quietly in the background when no other process is running**

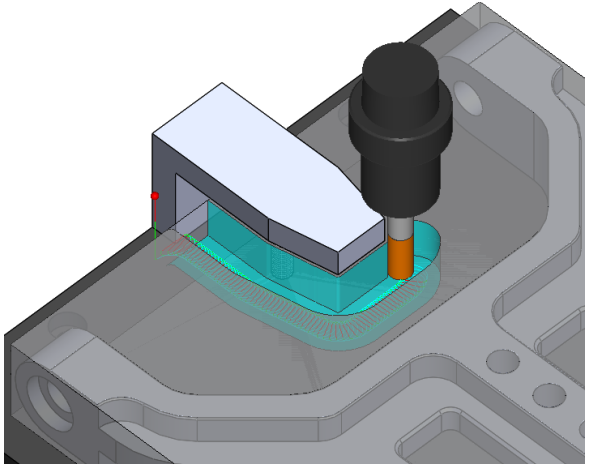
iMachining

Summary of new features

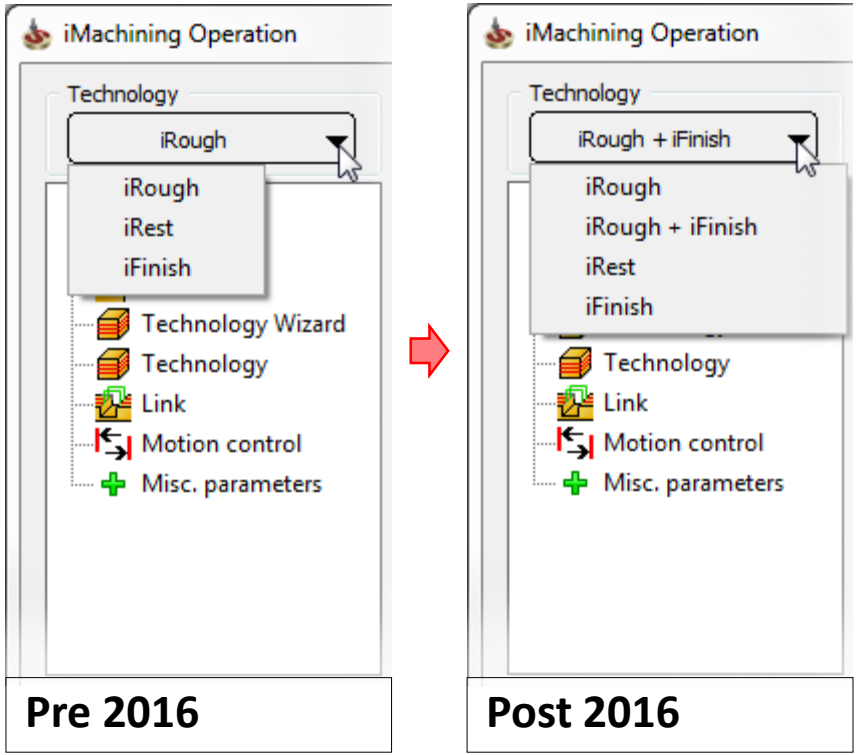
- **Optimized finishing of 2.5D features**
- **Automatic removal of material left by predrill tip**
- **Fixture avoidance in iMachining 3D**







New and Improved Technology types



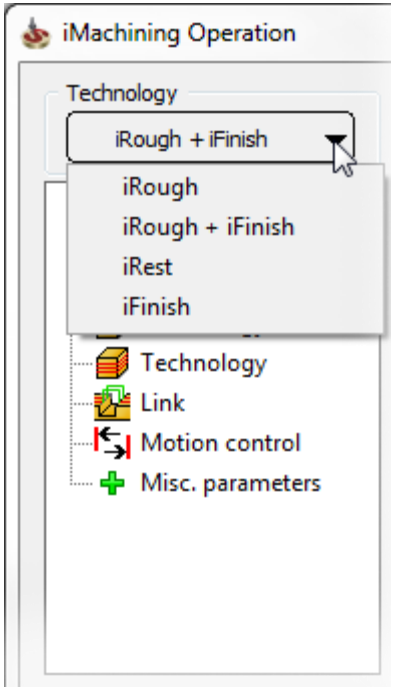
Pre 2016

Post 2016

New and Improved Technology types:

- **iRough + iFinish**
- **iFinish**

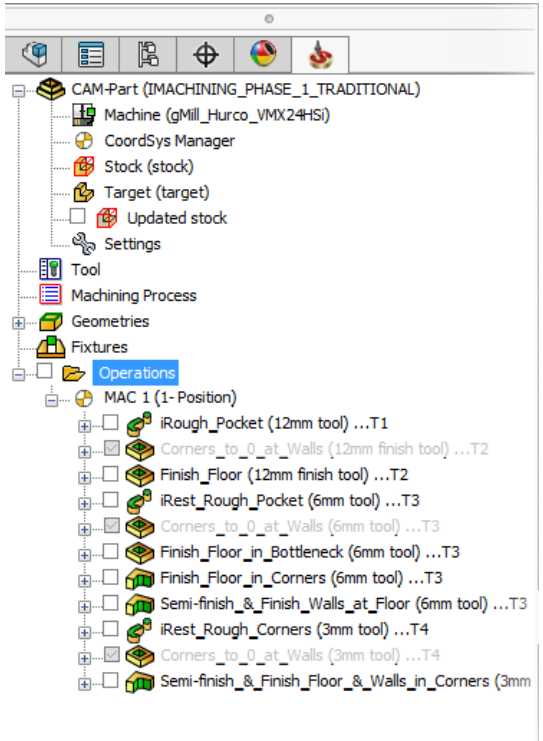
Programming made simple with iMachining



Combined functionality automates the machining process:

- **iRough + iFinish**
  - **Suitable for prototyping and the machining of soft materials, where a single tool can be used for roughing and finishing**
- **iFinish**
  - **Suitable for high quantity runs and the machining of hard materials, where a separate tool is used for finishing the floor and walls**
- **Finish after finish (using iFinish)**
  - **Finishes only the necessary areas where previous tools cannot fit**

Common challenges of traditional machining

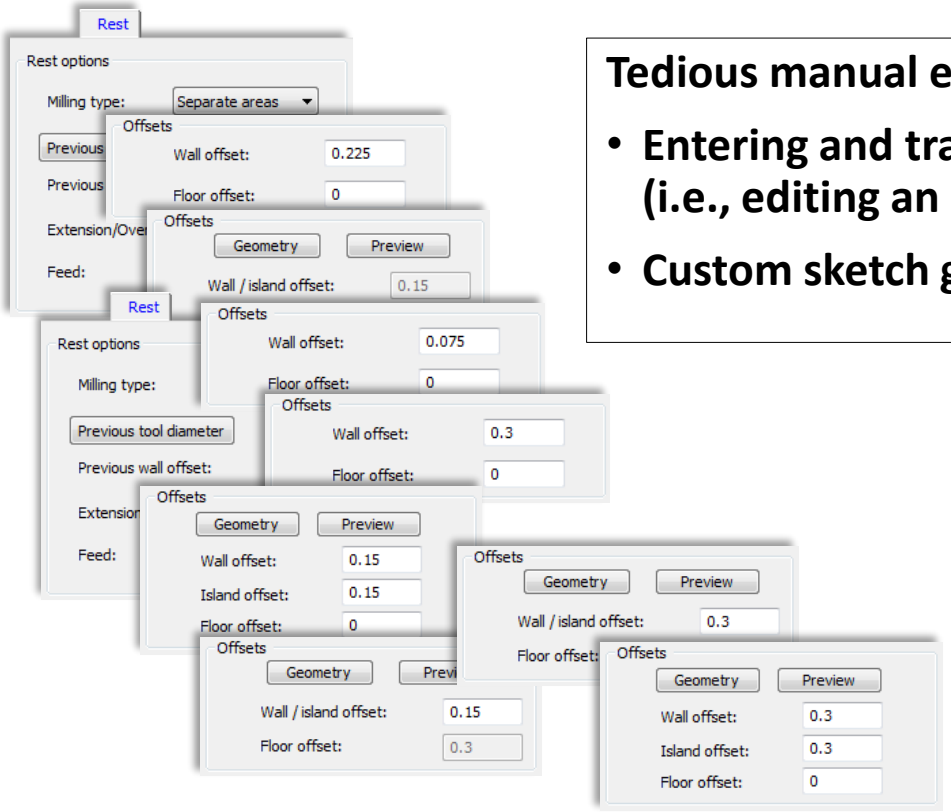


Total number of operations in this example (10+)

- **Time intensive when optimized tool path is desired**
- **Operations often omitted and shortcuts taken (e.g., avoid pre-finishing the corners to 0 at walls by increasing number of step downs during wall finish)**
  - **Reduces programming time and over engagement of the tool in the corners**
  - **But increasing the number of step downs is likely to increase overall cycle time**

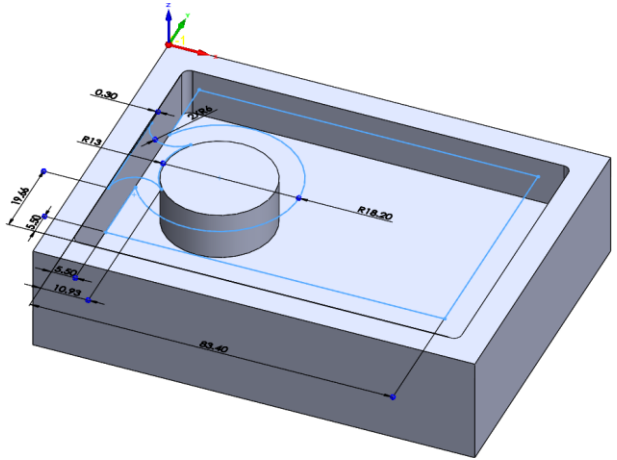
Omitted operations are suppressed in this example

Common challenges of traditional machining (cont.)

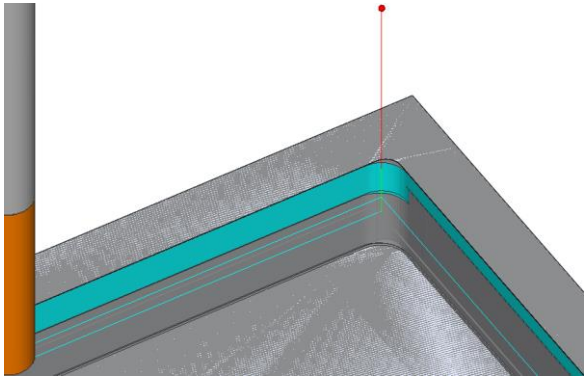


Tedious manual efforts are typically required such as:

- **Entering and tracking of offsets and rest material data (i.e., editing an operation affects all related ones)**
- **Custom sketch geometry often needed**

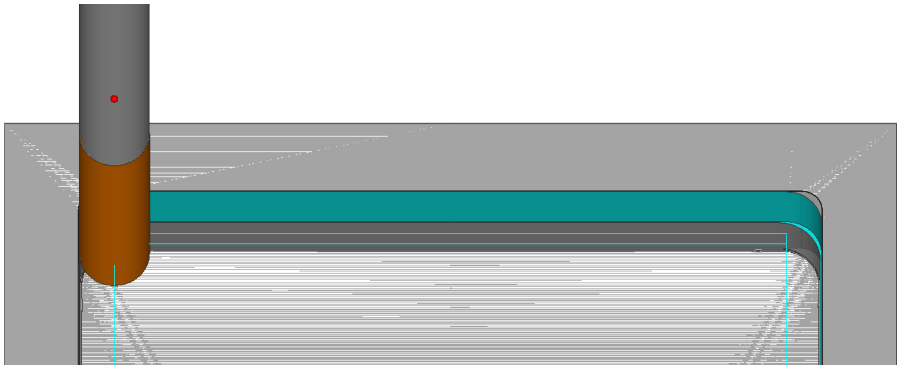


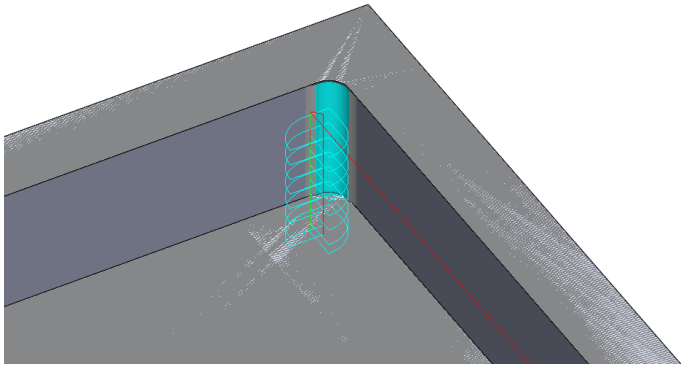
Common challenges of traditional machining (cont.)



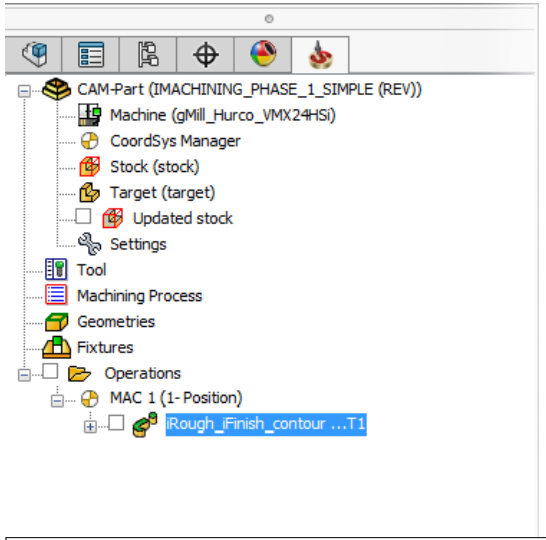
Inherent problems that are difficult to avoid without manually optimizing tool path:

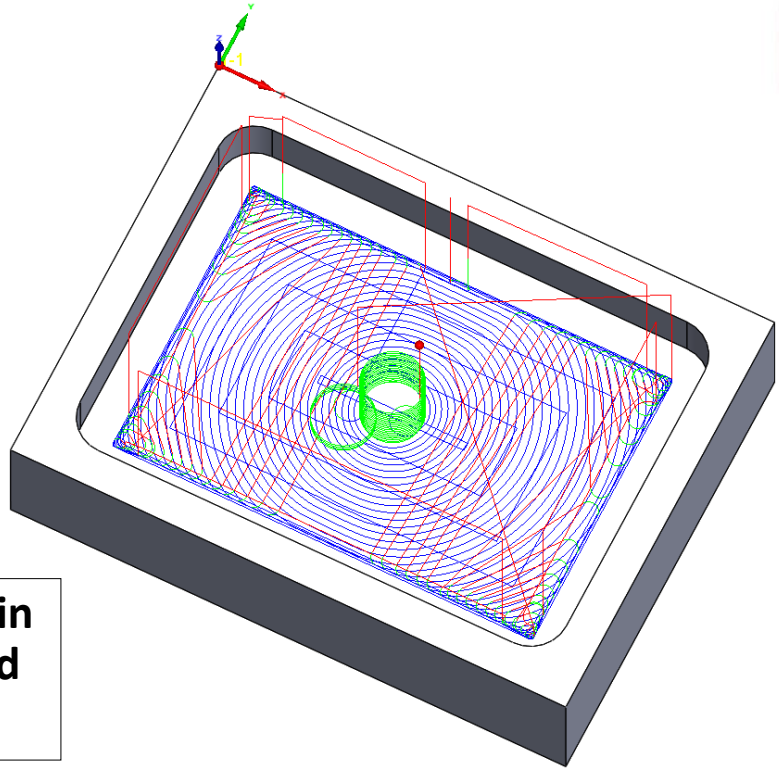
- **Tool plunges on stock when finishing**
- **Uncontrolled tool load when cutting in corners**
- **Air cutting when working in tight areas/corners**





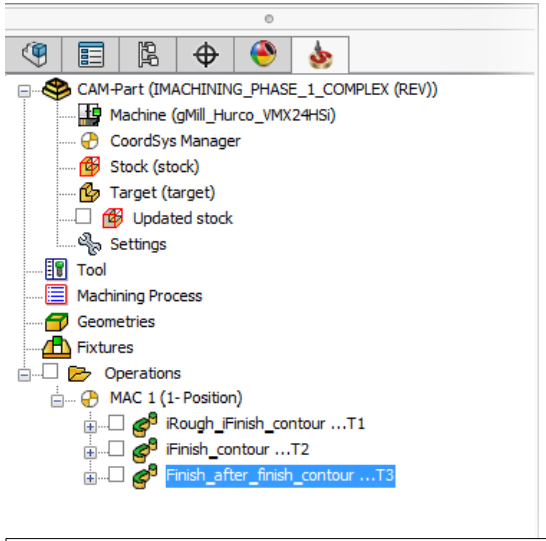
iRough + iFinish: Single tool with a Contour style floor finish

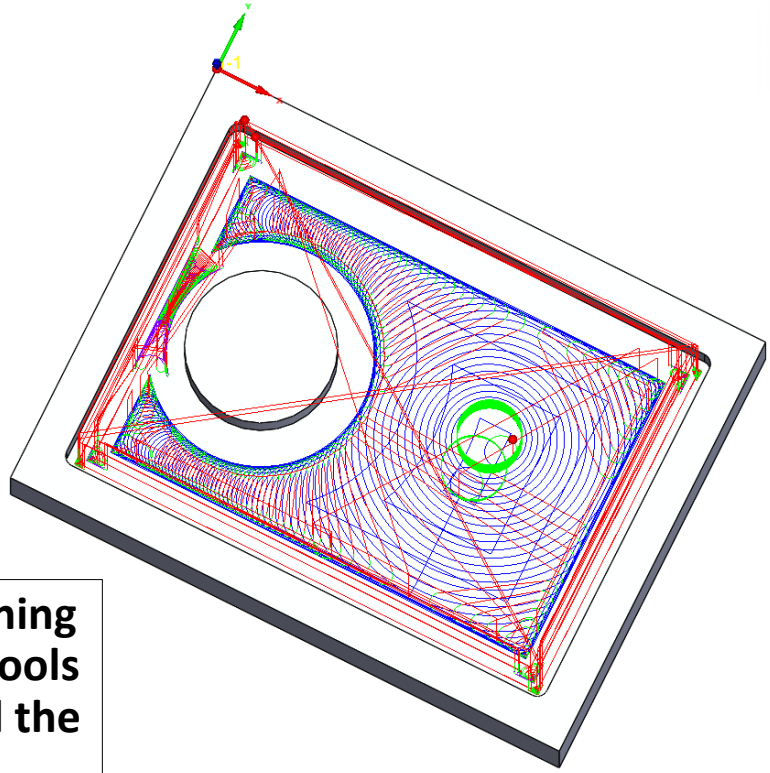




Optimized roughing and finishing tool path in just one operation (used for prototyping and the machining of soft materials)

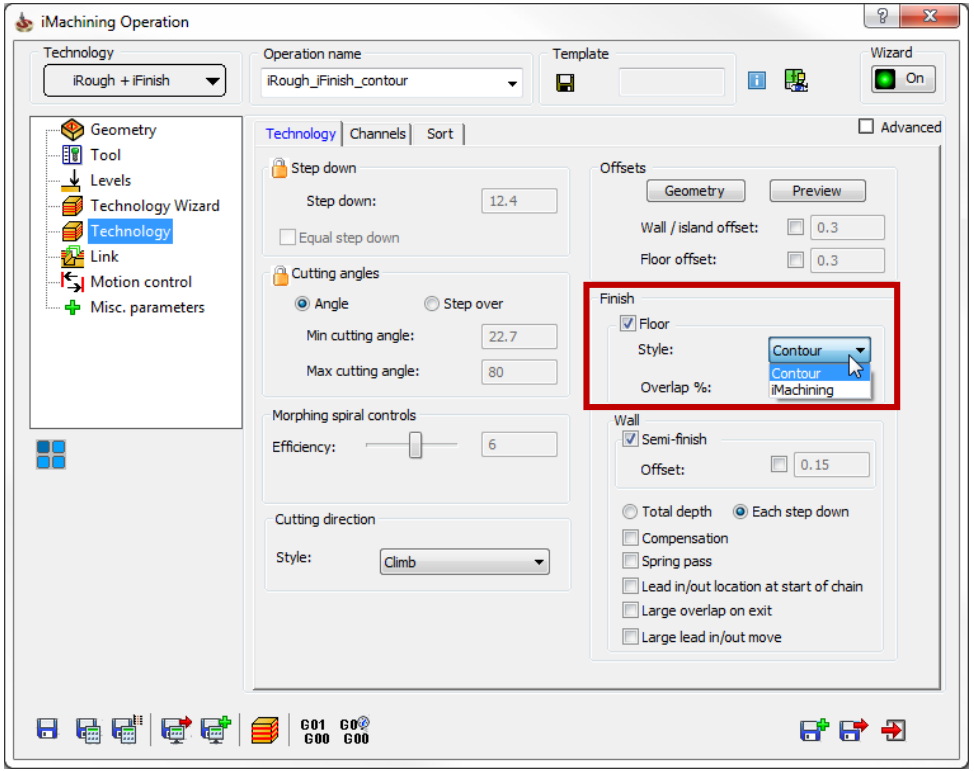
Roughing with three separate tools used for finishing



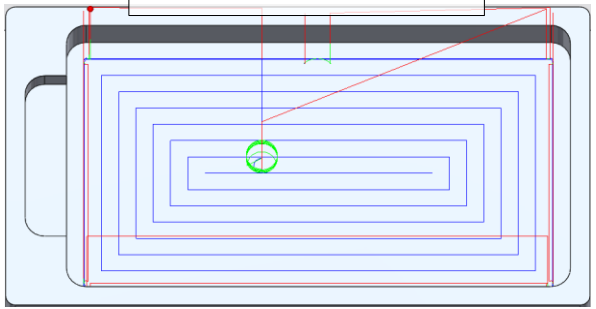


Optimized roughing, rest roughing and finishing tool path in three operations, where three tools are needed (used for high quantity runs and the machining of hard materials)

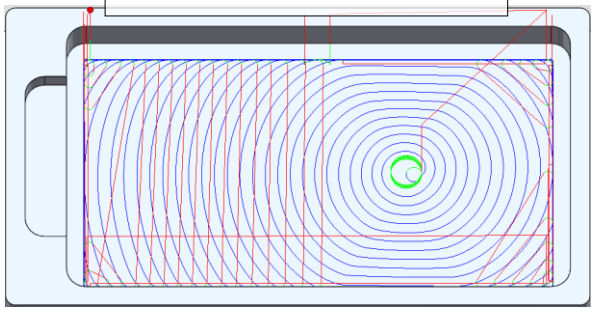
iMachining enhancements: Floor finishing styles



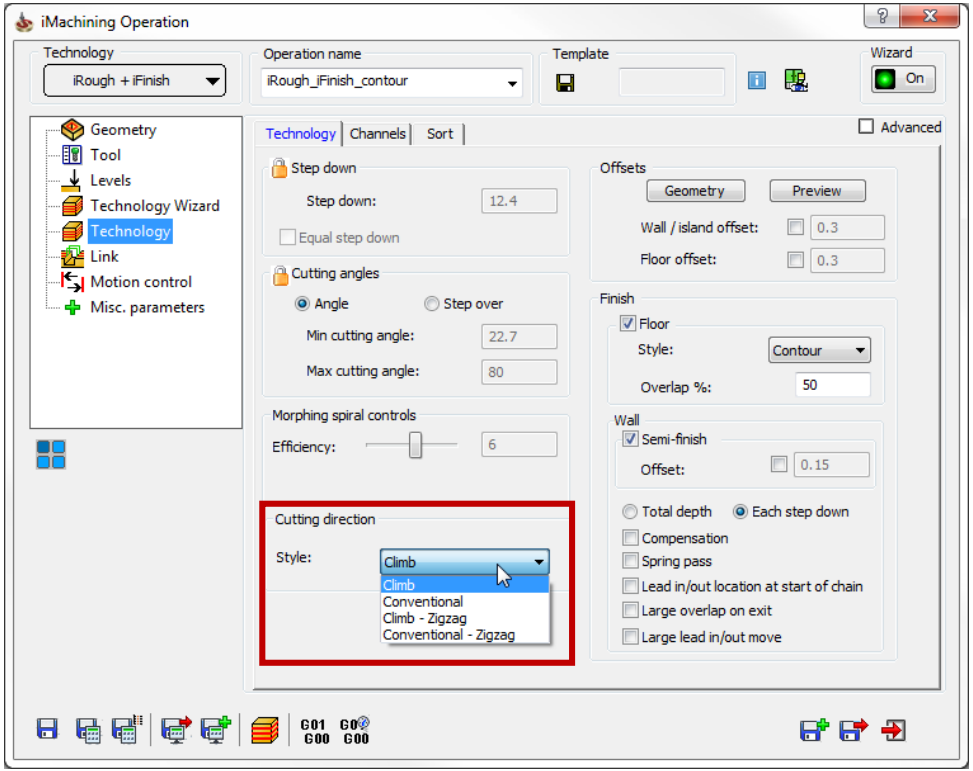
Contour option



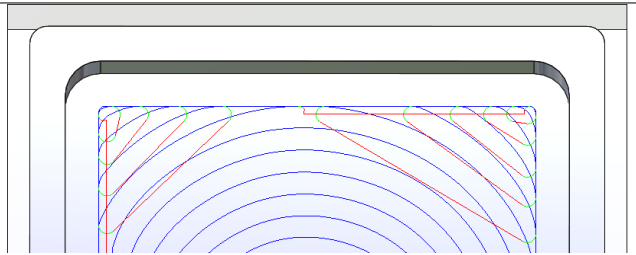
iMachining option



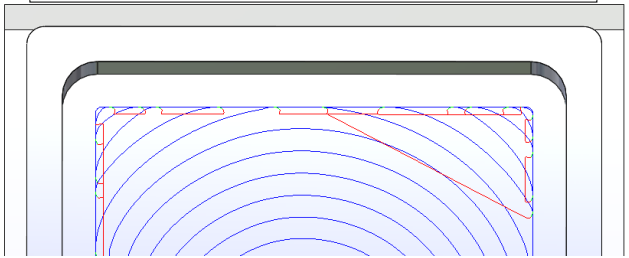
iMachining enhancements: Cutting direction styles



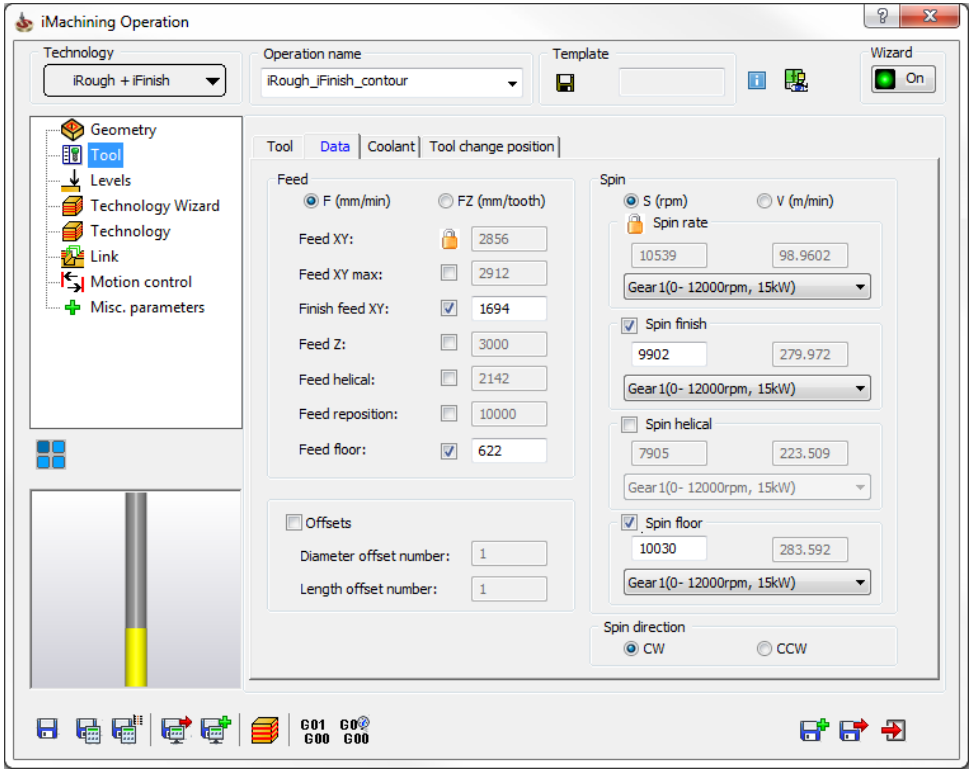
Climb / Conventional styles with trochoidal-like tool path in corners



Zigzag tool path in corners

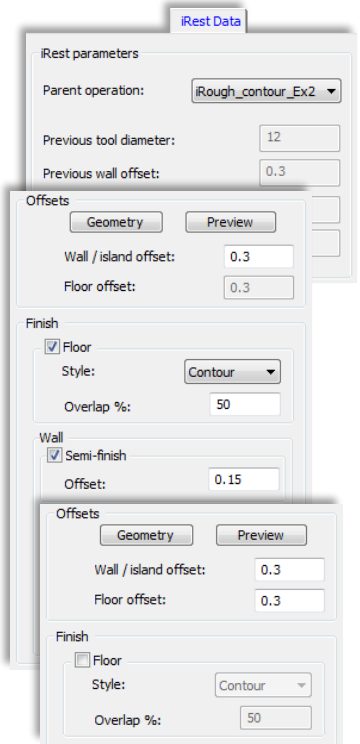


iMachining’s finish feeds and speeds



- **Full control in one operation includes Wall and Floor**
- **Automatically calculated by the Technology Wizard**
- **Override check boxes available if you have preferred values for finishing**

iMachining's associativity of data

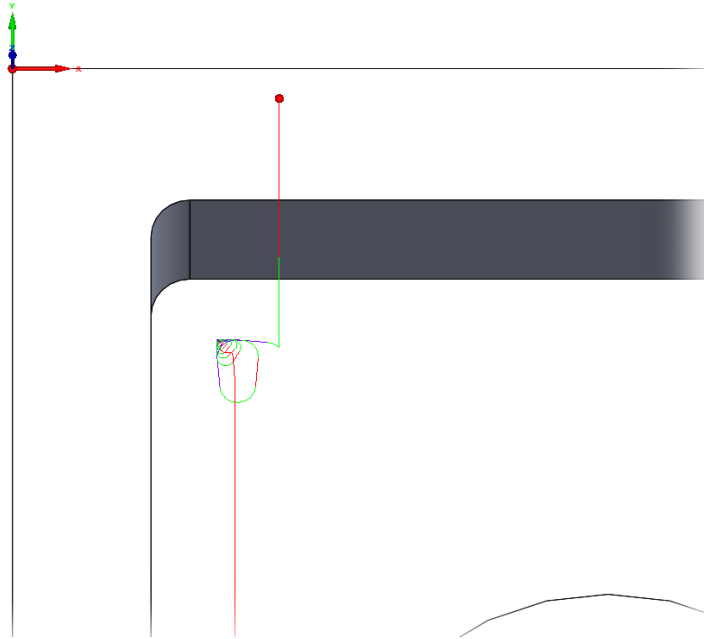


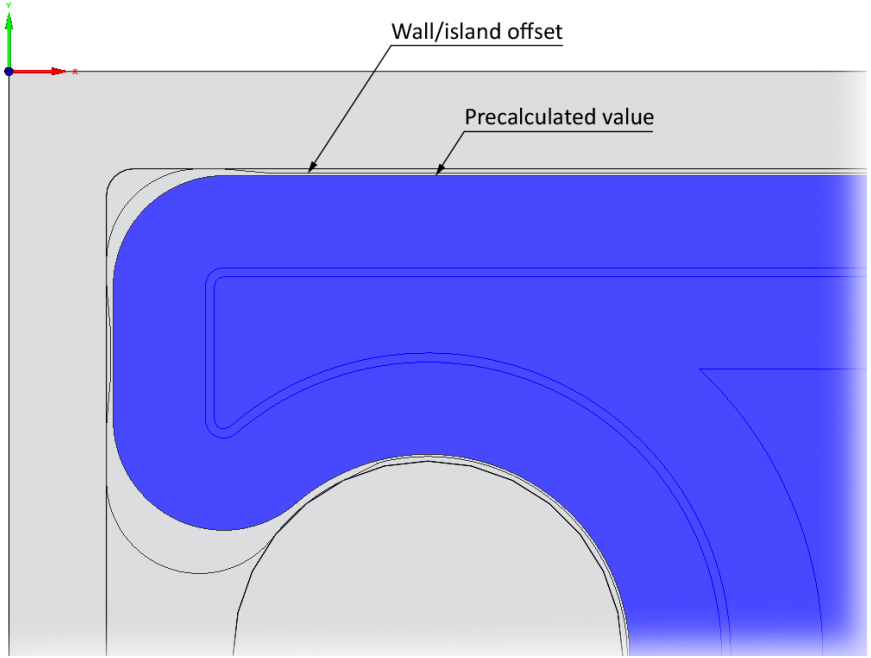
Operations that share a single geometry are linked when using Save & Copy:

- **If any settings are changed in the 1st operation, sequential ones are automatically updated**
- **Offsets inherited and iRest Data managed between operations**
- **Intelligent Finish technology eliminates all air cutting**
  - **If floor finishing is not detected in the 1st operation for example, the Floor option is enabled in the next operation**
  - **If floor finishing is detected in the 1st operation for example, then:**
    - **the Floor option is disabled in the next operation when using the same size tool**
    - **the Floor option is enabled in the next operation when using a smaller tool**

iMachining's optimized rest roughing and finishing tool path

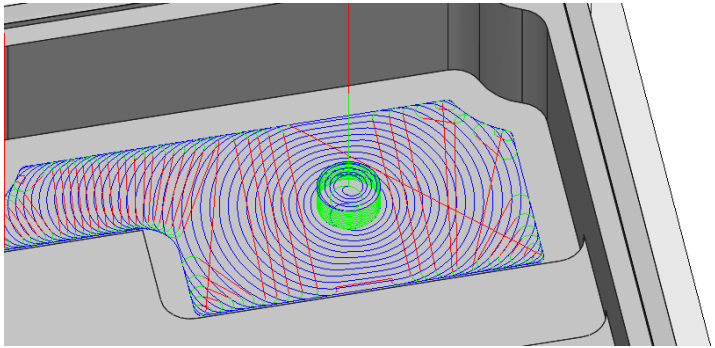
Automatic tangent tool path extensions so tool never plunges on stock

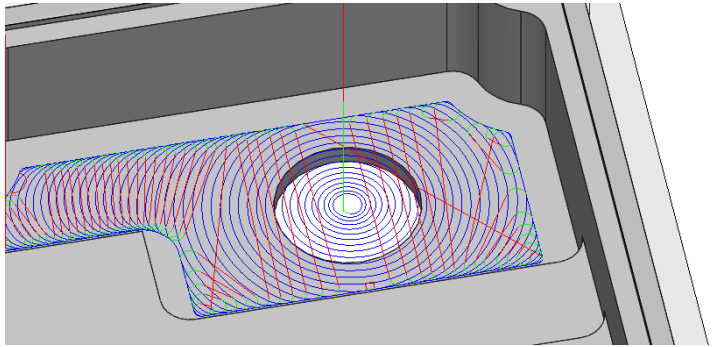




Tool automatically stays away from walls when finishing the floor

Predrilling data in iMachining 2D

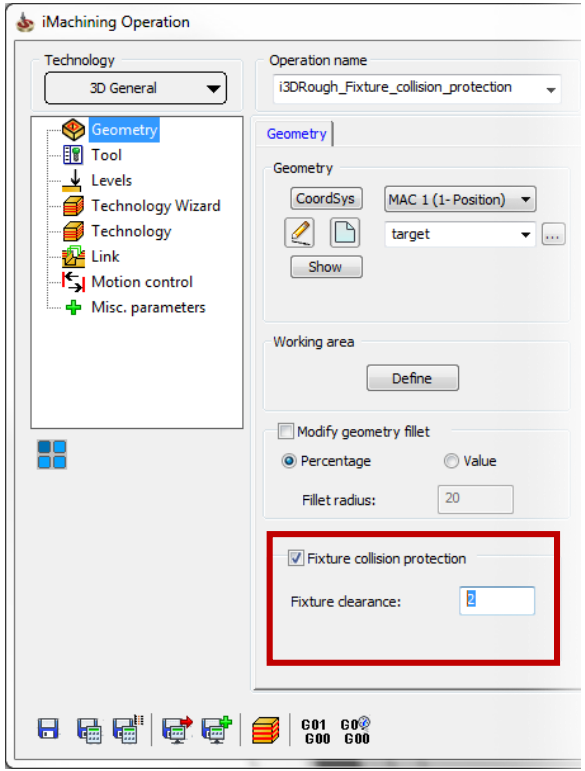




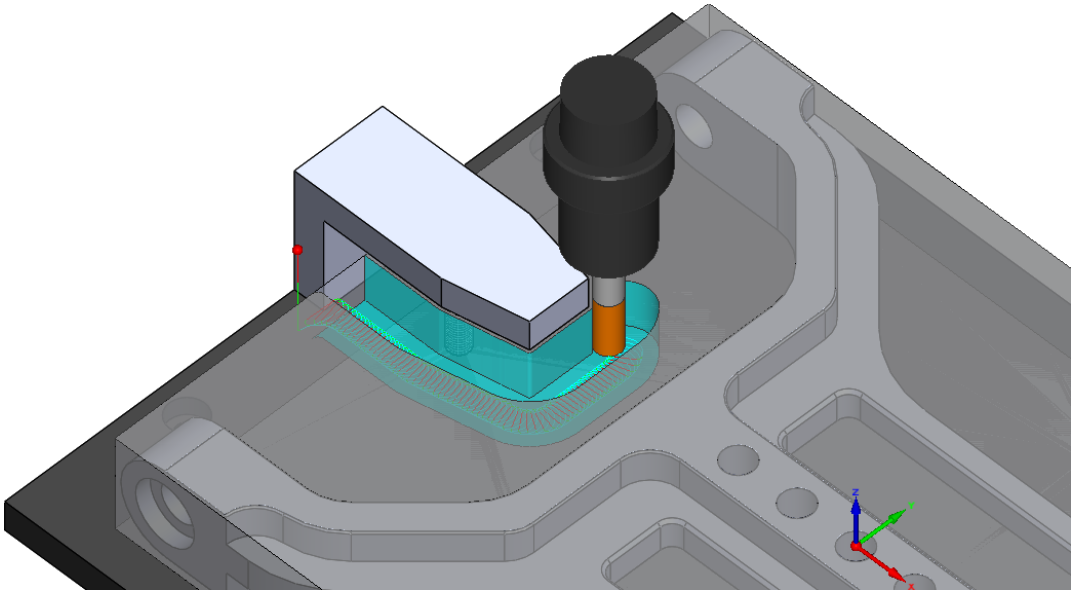
When predrilling data is defined, the entry tool path can now perform one of the following:

- **Automatic removal of drill point using a helical move where drill tip terminated at pocket floor**
- **Vertical feed down to the bottom of the pocket floor where a through hole was predrilled**

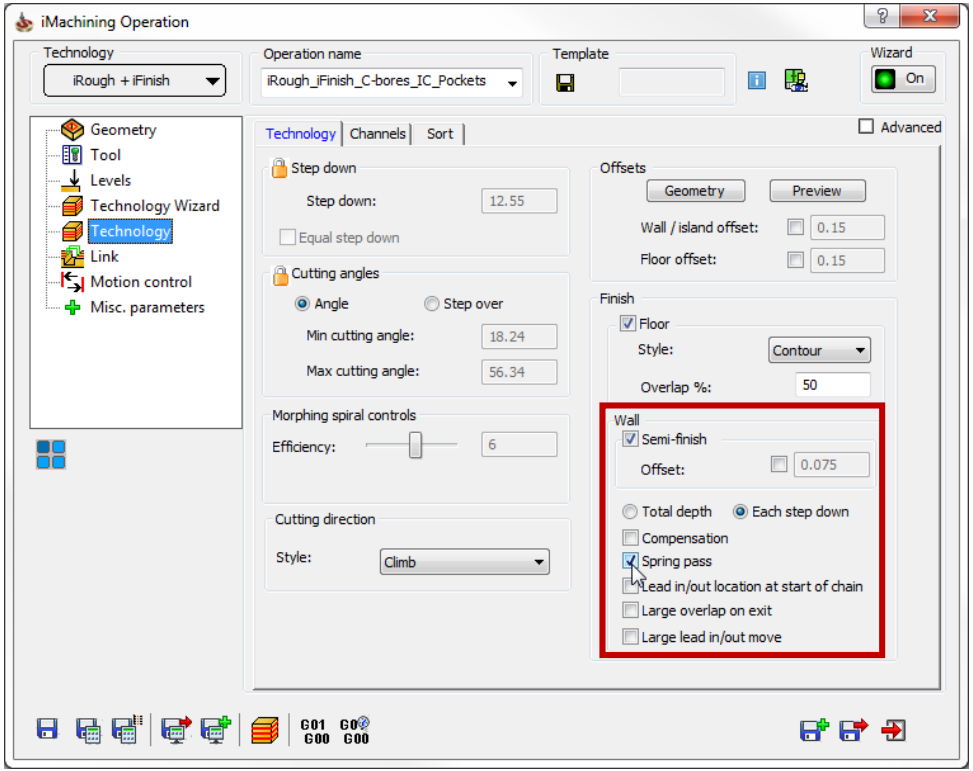
Fixture collision protection in iMachining 3D



Tool path is automatically adjusted to avoid contact between your defined setup and the selected tool

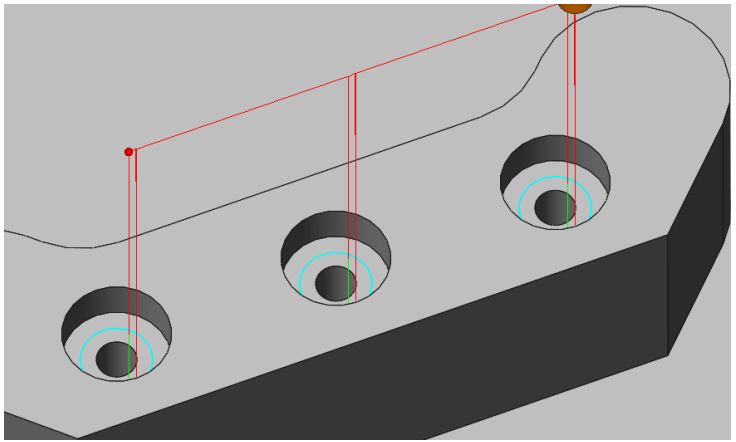


Precision machining with iMachining 2D



High accuracy can be achieved for:

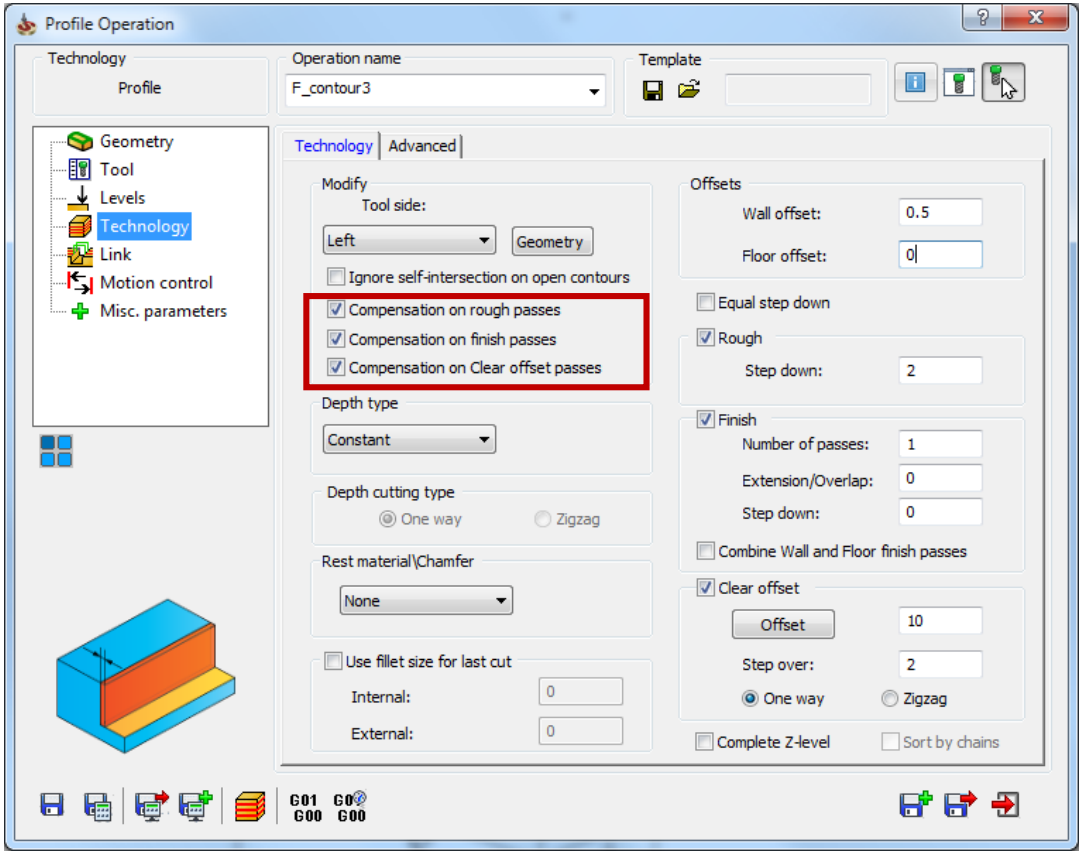
- **Circle milling bored holes**
- **Tight tolerance pockets**



Use Semi-finish with Spring Pass

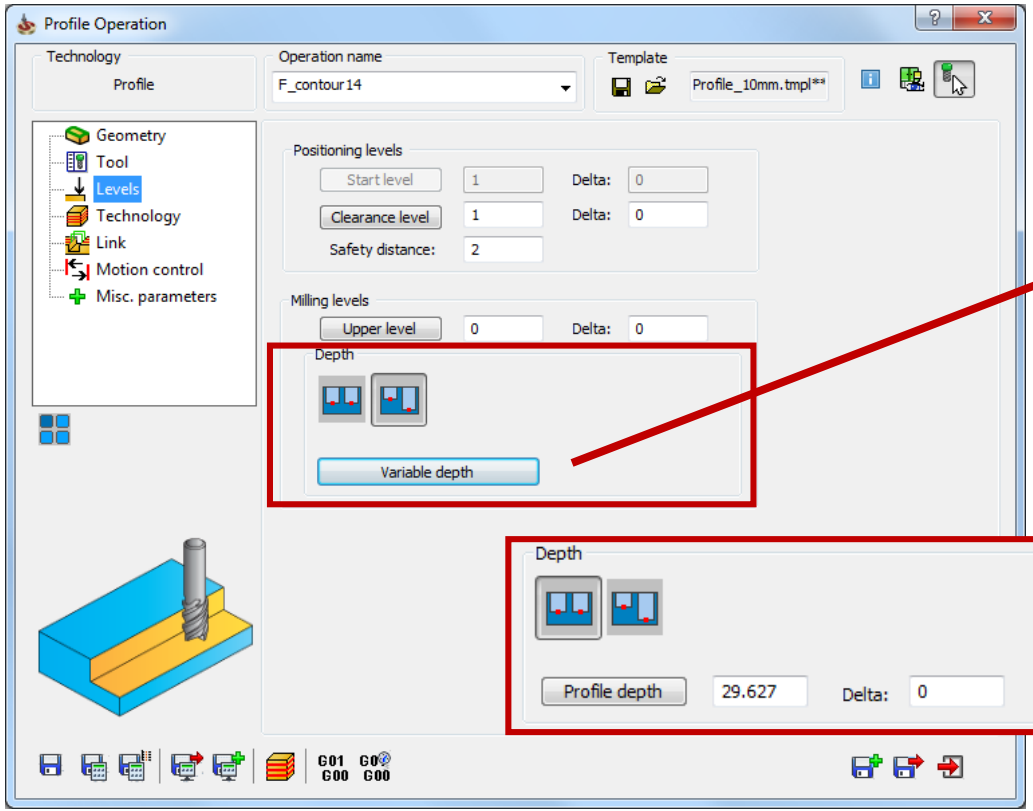
2.5D Milling

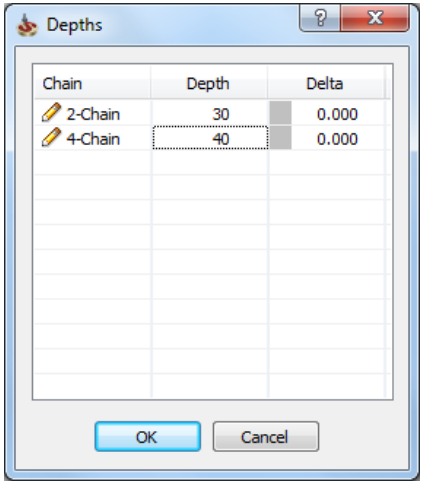
2.5D Milling: Compensation for Rough, Finish and Clear Offset separately



Possibility to turn on compensation separately for Rough, Finish and Clear Offset passes.

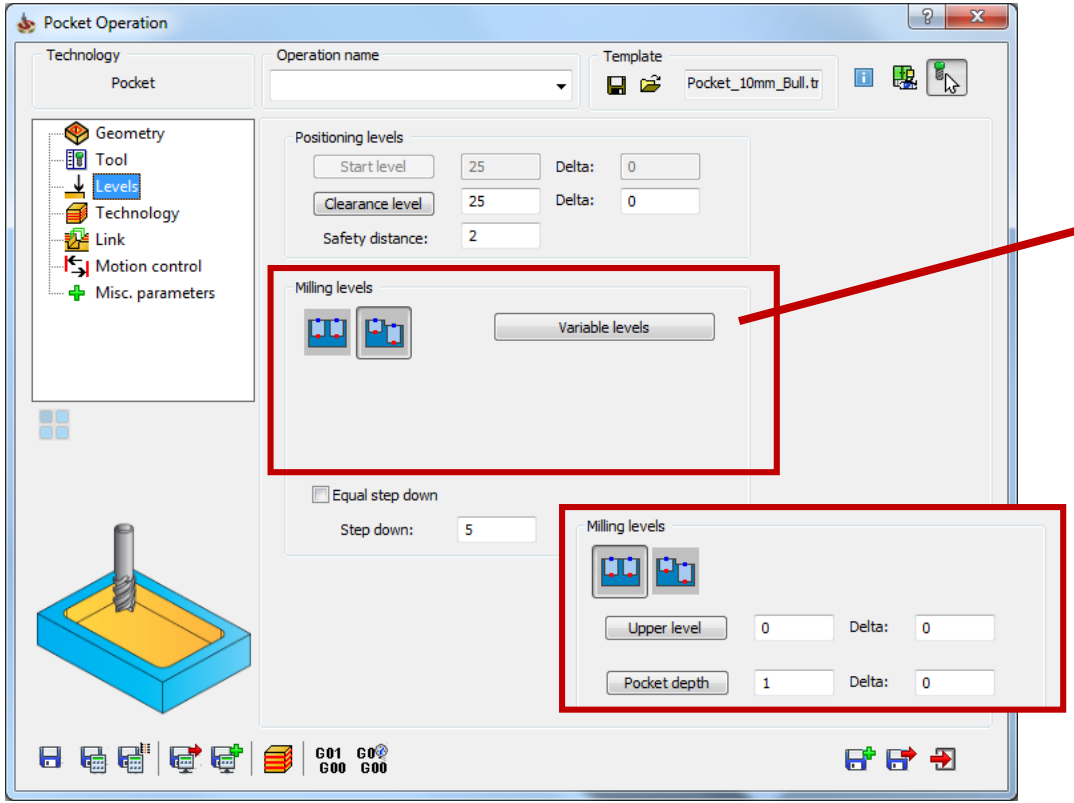
2.5D Milling: Variable Depth in Profile

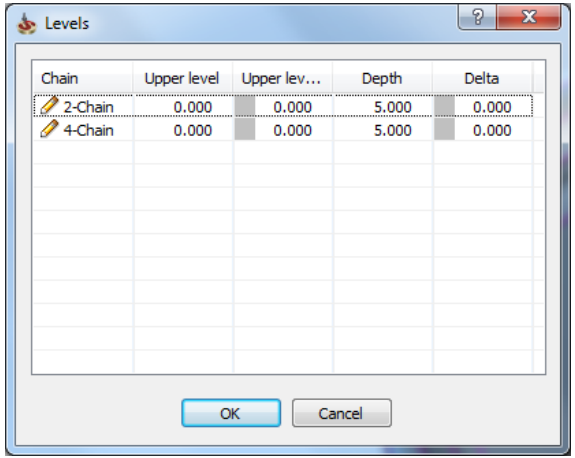




Possibility to define various depth for each profile chain

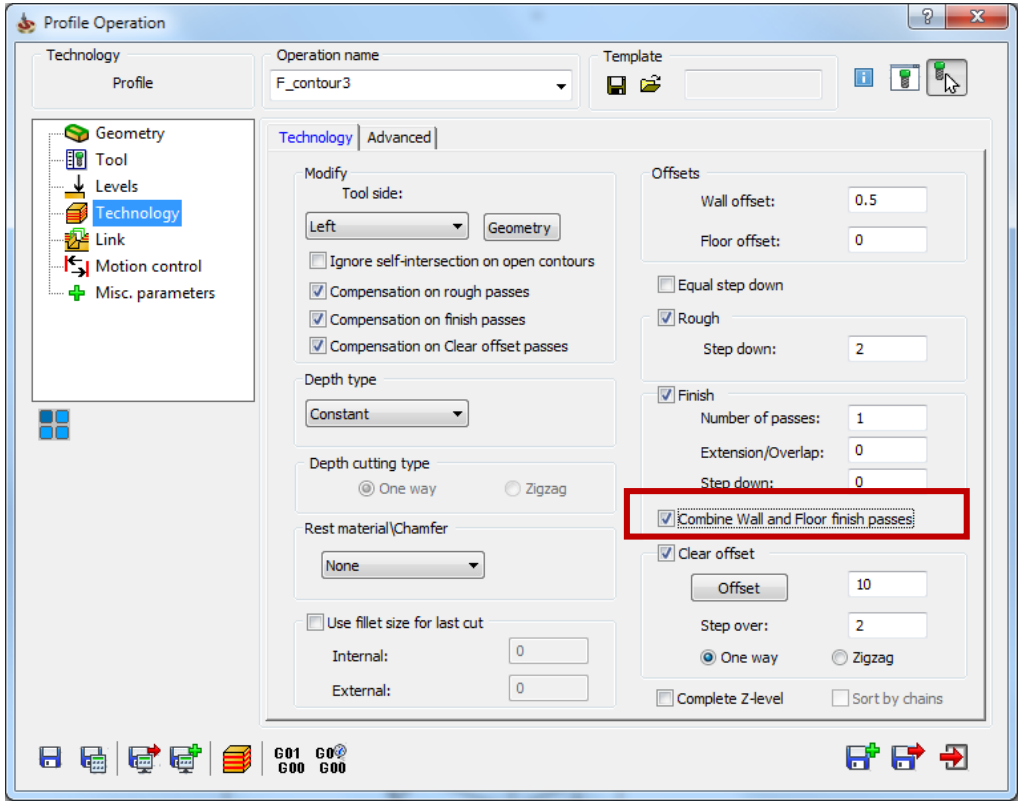
2.5D Milling: Variable Levels in Pocket



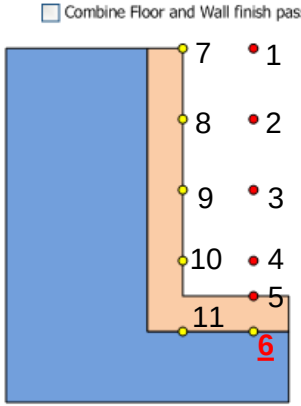


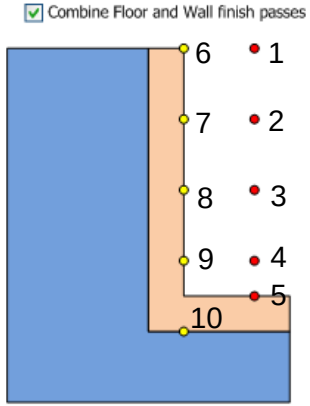
Possibility to define various upper level and depth for each pocket chain

2.5D Milling: Combine Wall and Floor finish passes

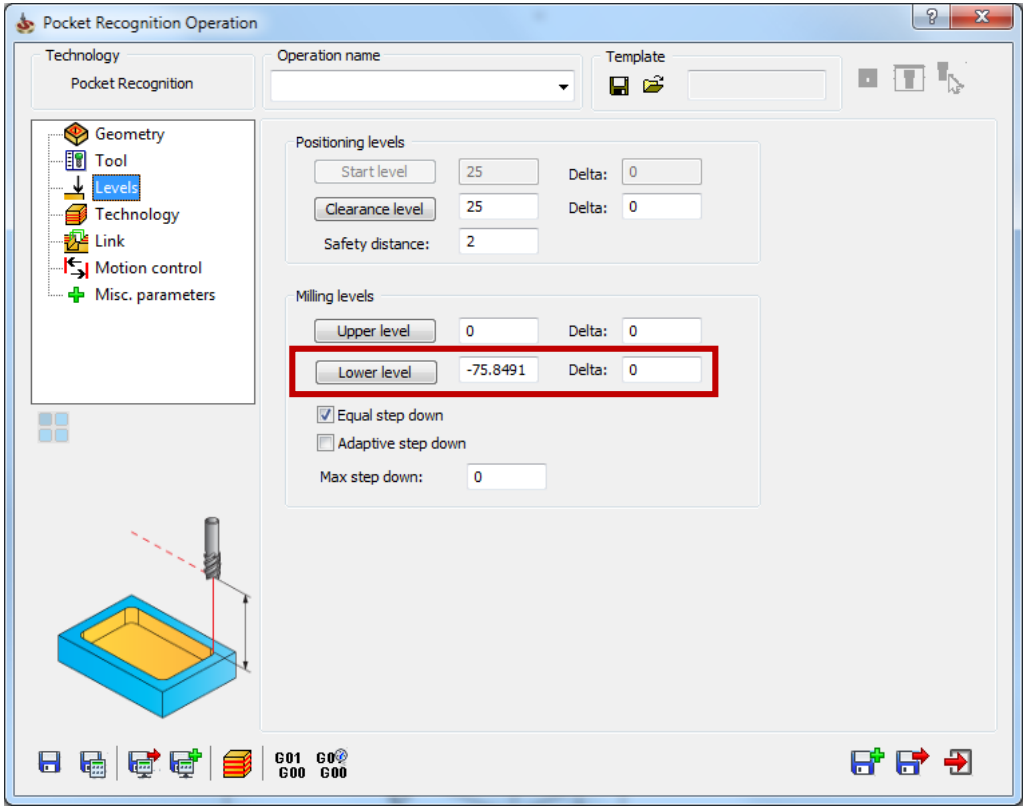


Combine wall and floor offset passes to one pass

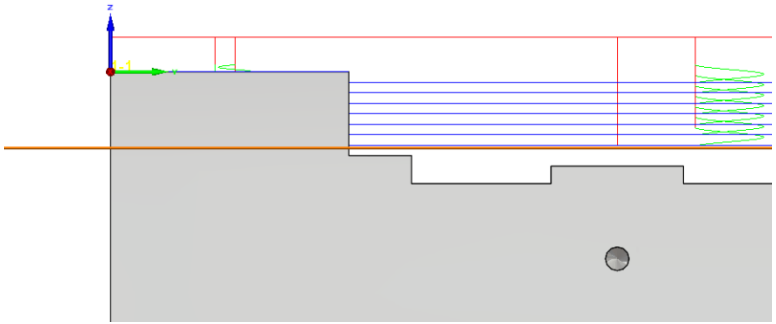




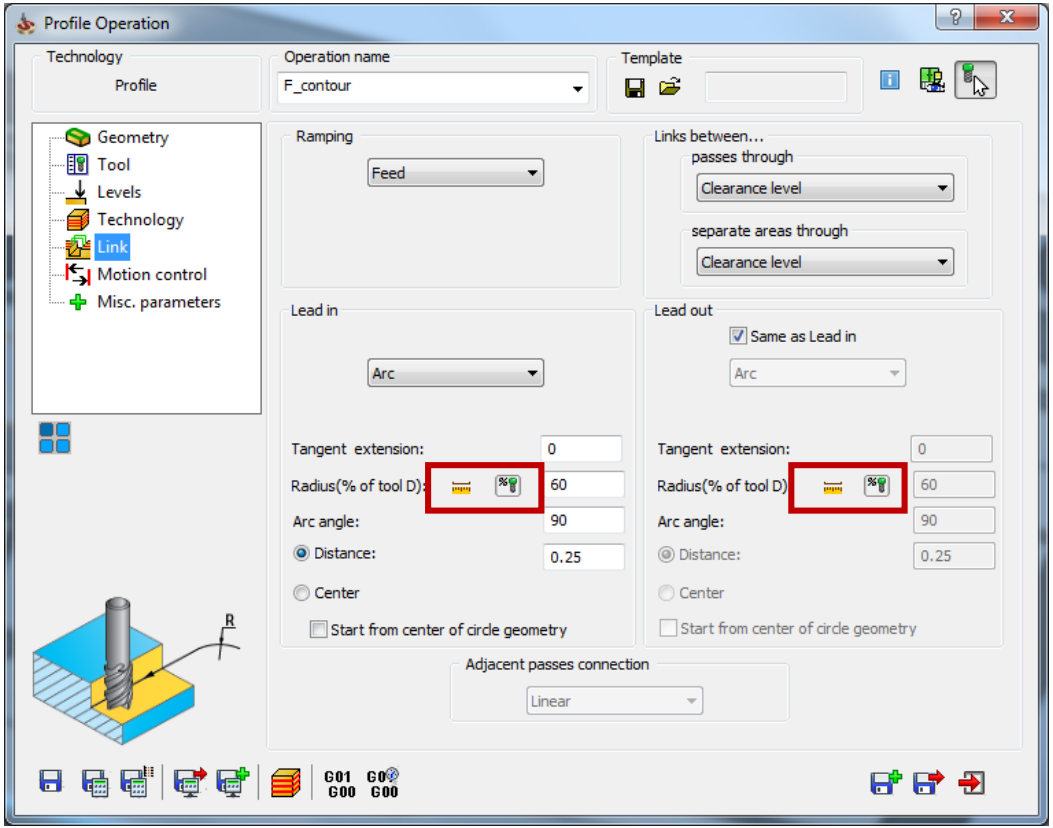
Pocket Recognition: Limit the machining depth



Limit the depth of cutting in Pocket Recognition operation

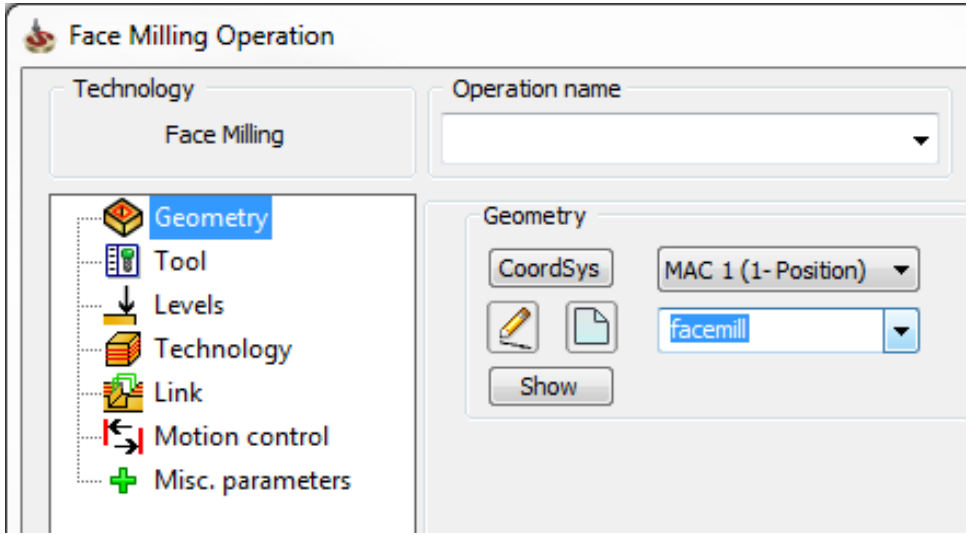


2.5D Milling: Lead in/out radius in % of tool diameter



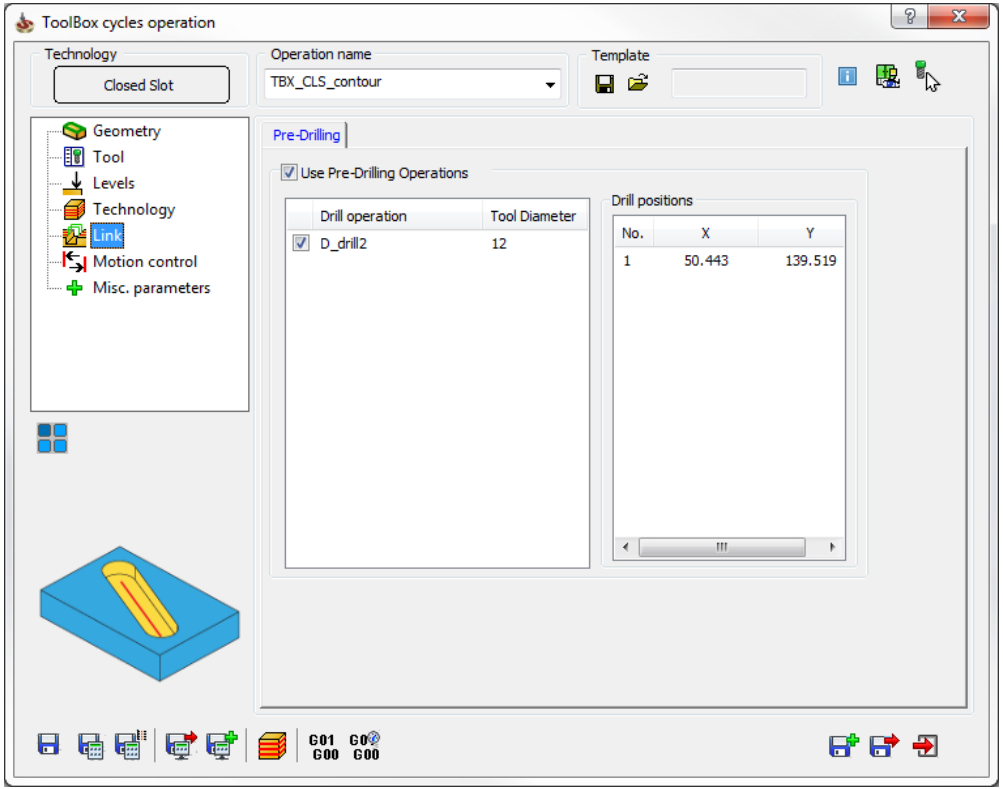
Possibility to define lead in radius and lead out radius not only in mm/inch, but also in % of tool diameter.

Face Milling: Auto definition of geometry



Facemill geometry of the Target is automatically defined when creating a new Face Milling Operation, to speed up programming.

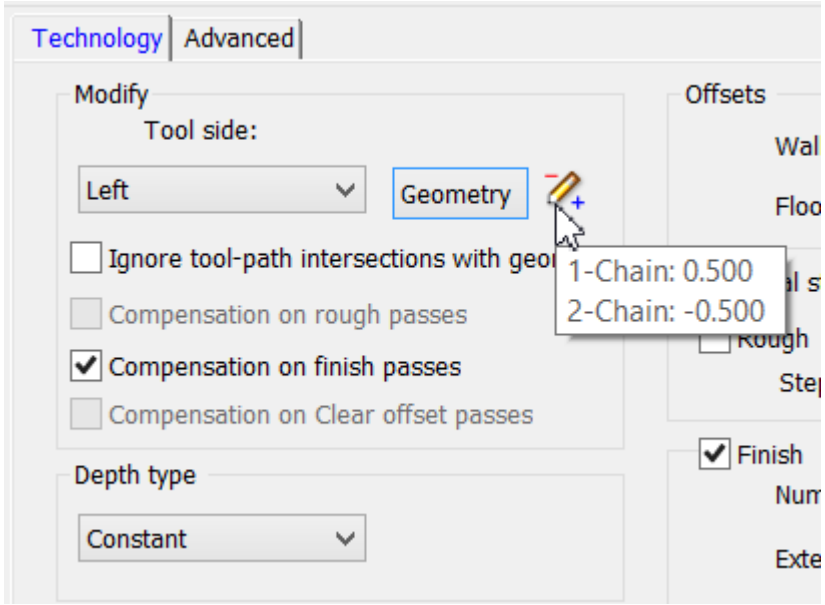
ToolBox cycles: New approach option



Previous drill operations can now be defined as approach in slot operations using ToolBox cycles for:

- **Closed Slots**
- **Additional Zigzag Slots**

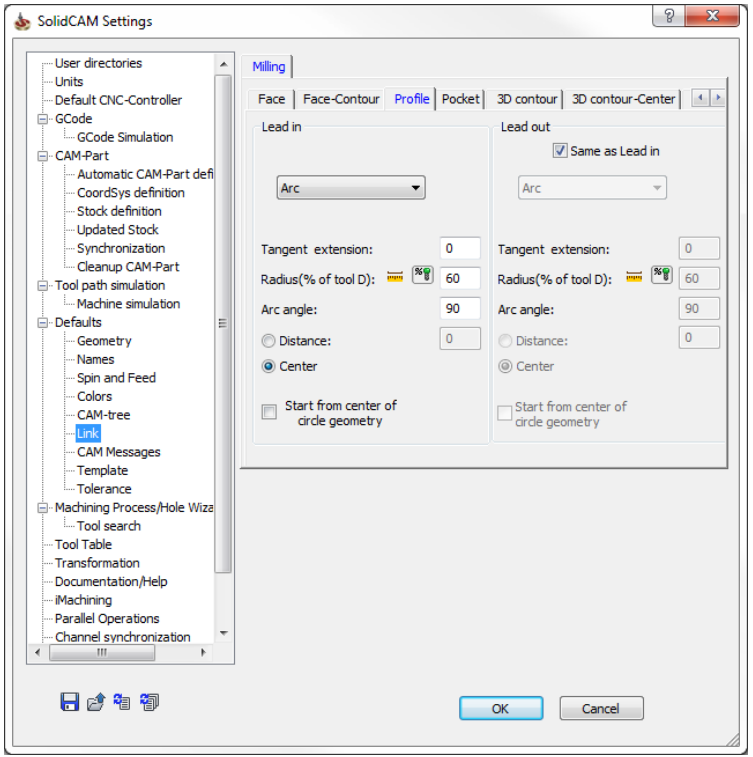
Modify Geometry: Visual feedback and tooltip for offsets



Enhanced visual feedback:

- **The pencil icon now represents a positive or negative offset on the geometry**
- **A tooltip is now shown to give detailed information on each chain‘s offset**

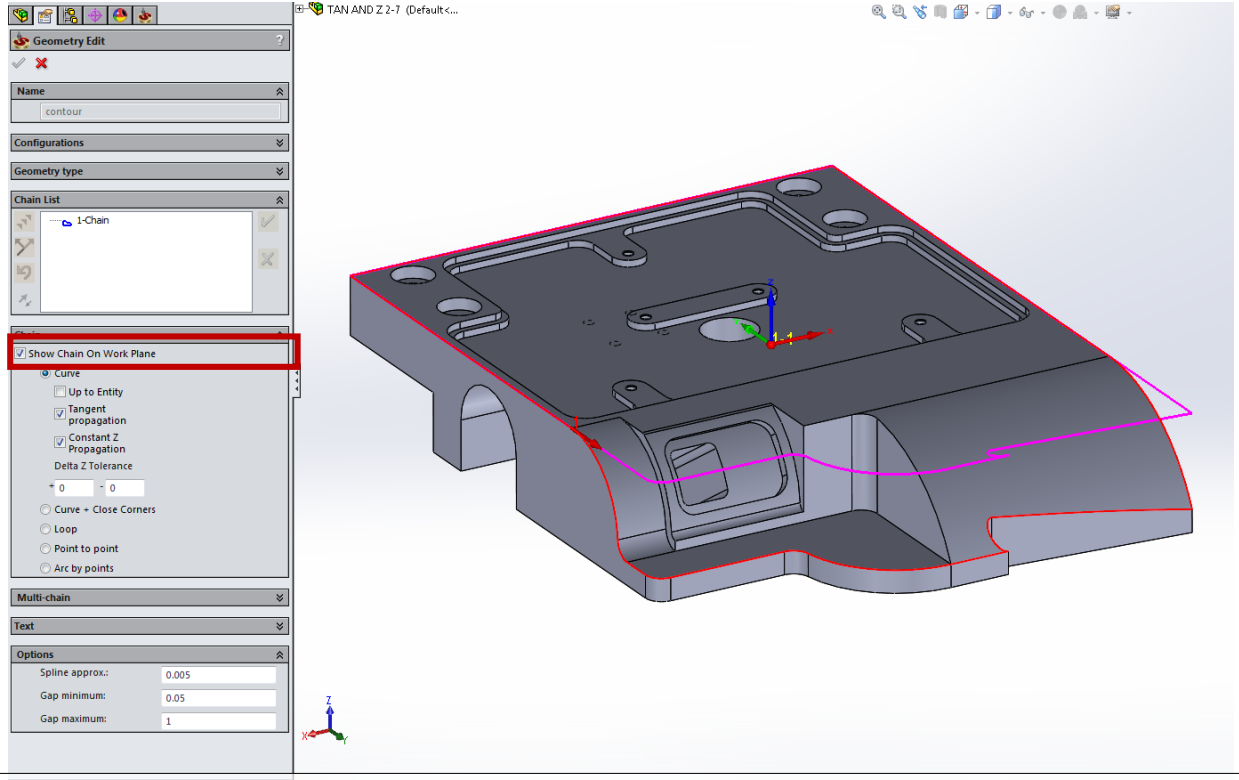
CAM Settings: Control over Lead in/out defaults



For each operation type, you can define the default parameters of the tool link movements.

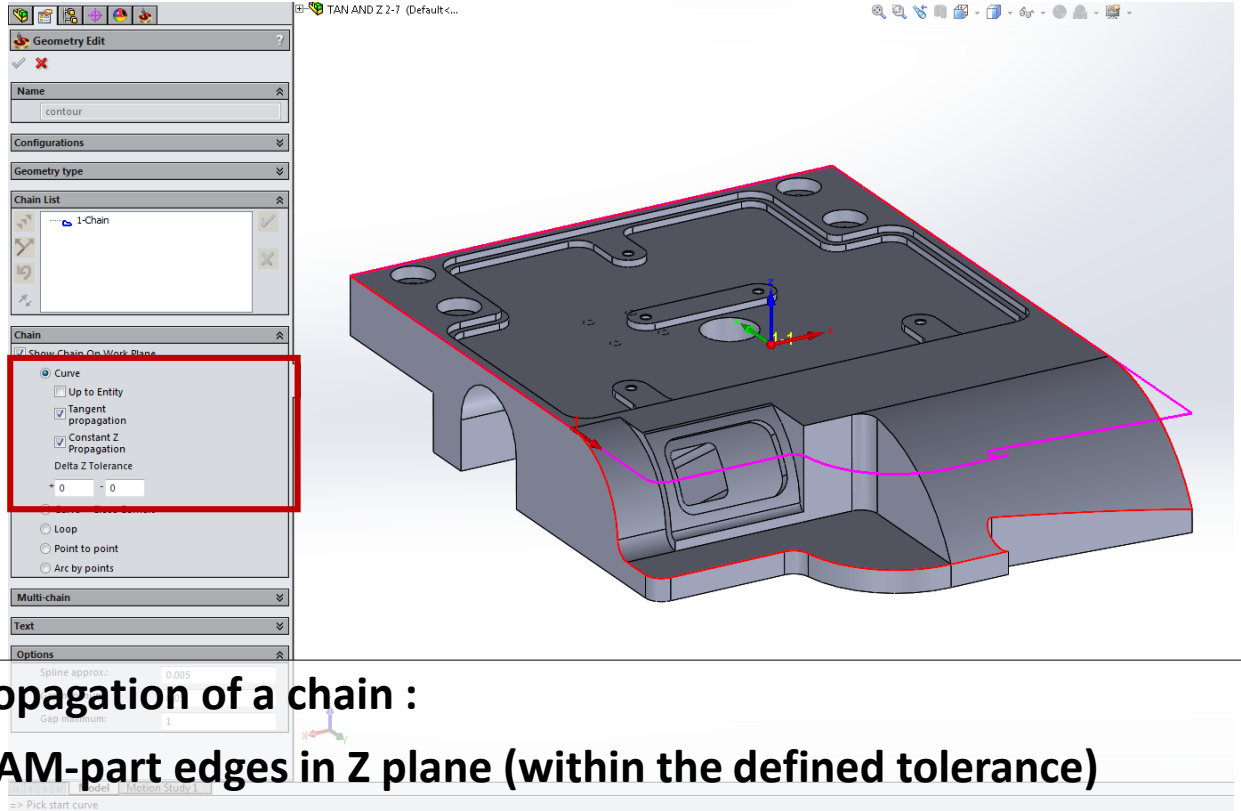
Geometry

Geometry: Show Chain On Work Plane



- **Shows the chain projected to the XY plane (the way it will be used in the operation)**

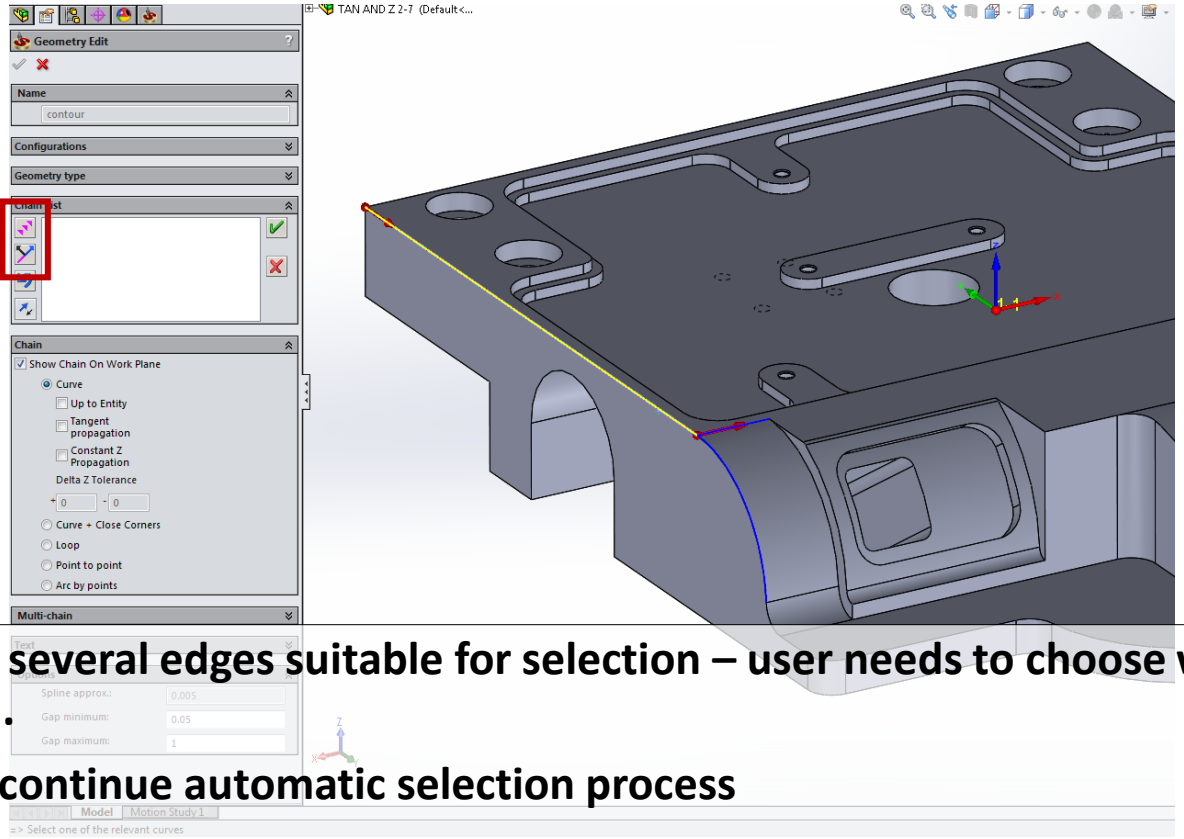
Geometry: New Propagation options



Automatic propagation of a chain :

- **Along the CAM-part edges in Z plane (within the defined tolerance)**
- **Along edges tangential to the previously selected one**

Geometry: New Buttons for faster chain selection

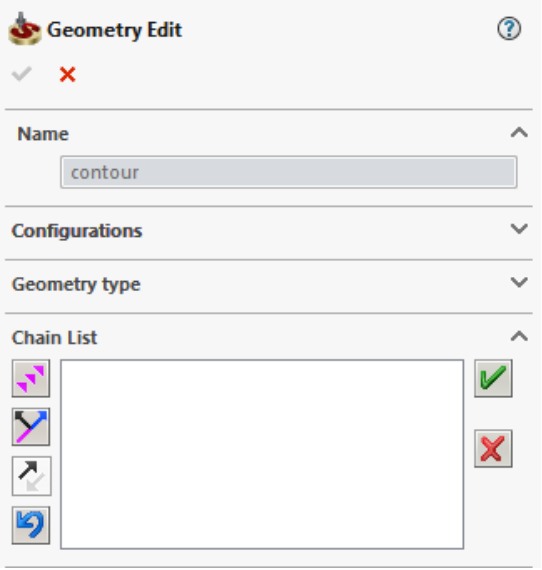


When there are several edges suitable for selection – user needs to choose which one should be taken.

- button to continue automatic selection process

- button for direction selection

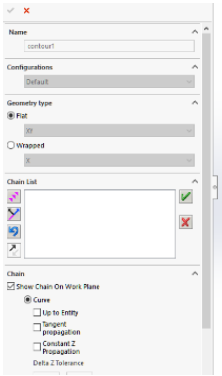
Geometry: Hot keys associated to chain buttons

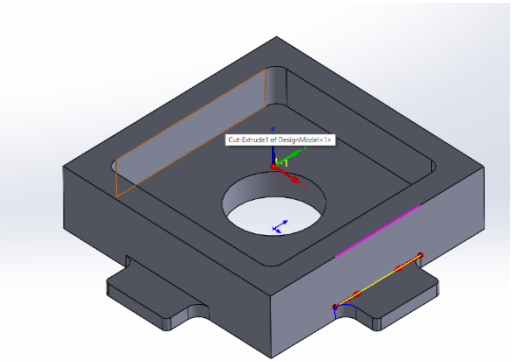


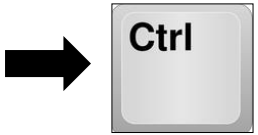
Process of defining chains is simplified with hot keys:

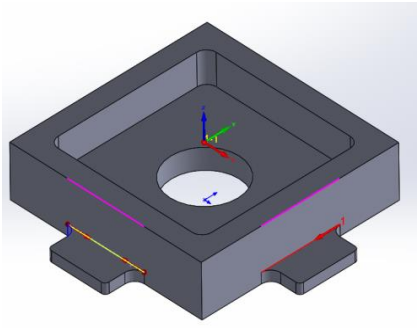
- **Add Selected Element uses F6 hot key**
- **Change Direction uses F7 hot key**
- **Reverse uses F8 hot key**
- **Undo step uses Backspace hot key**

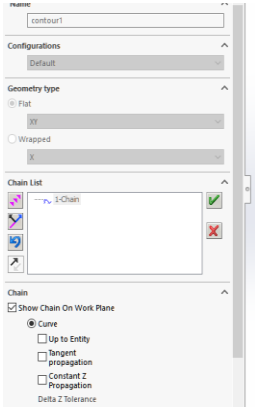
Geometry: Next Chain Creation

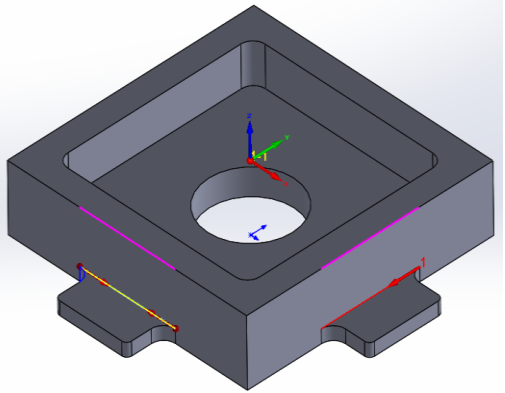






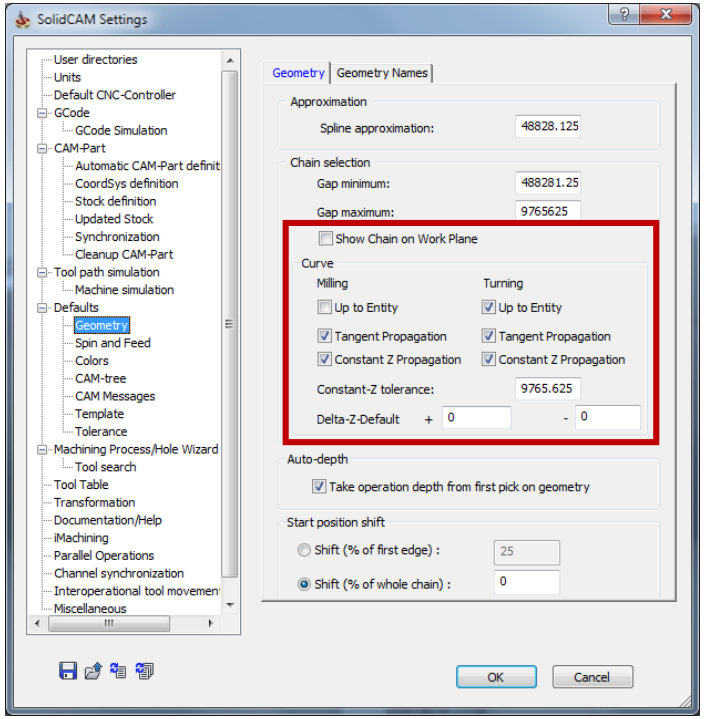






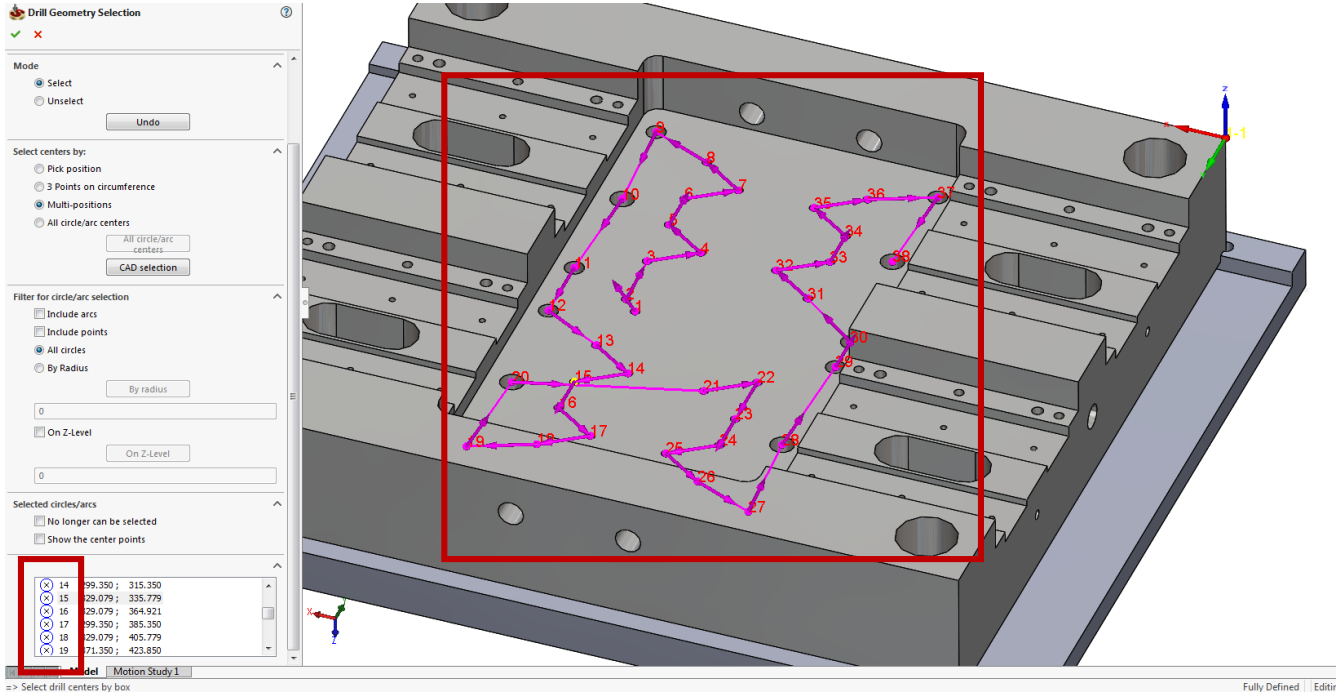
Holding the Control button and picking the next curve will start to create your next chain.

Geometry: Control over chain selection defaults



Possibility to define in settings which options are active by default.

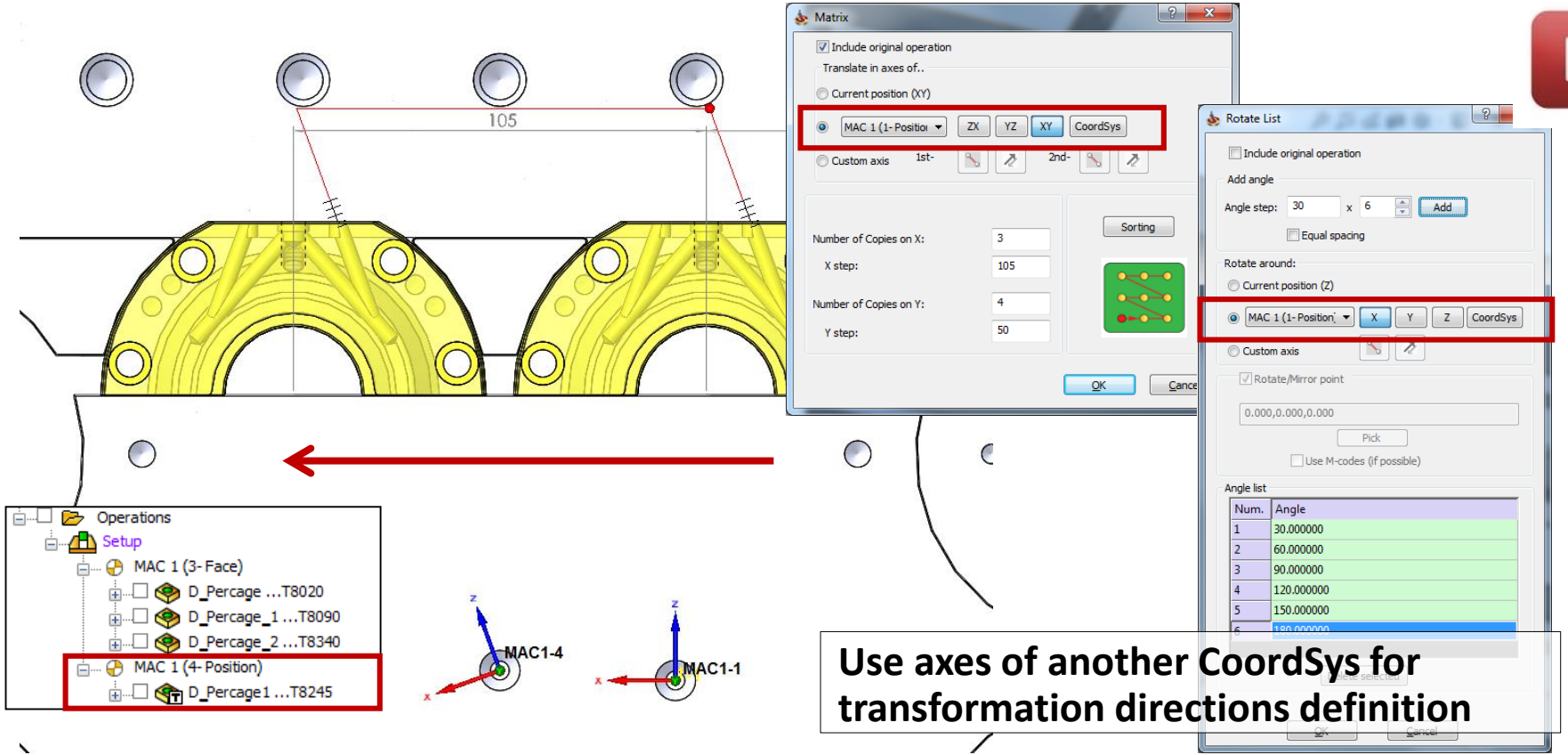
Geometry: Preview of holes numbers in drill geometry



Better visualisation of defined holes and easier matching with the list of drill points.

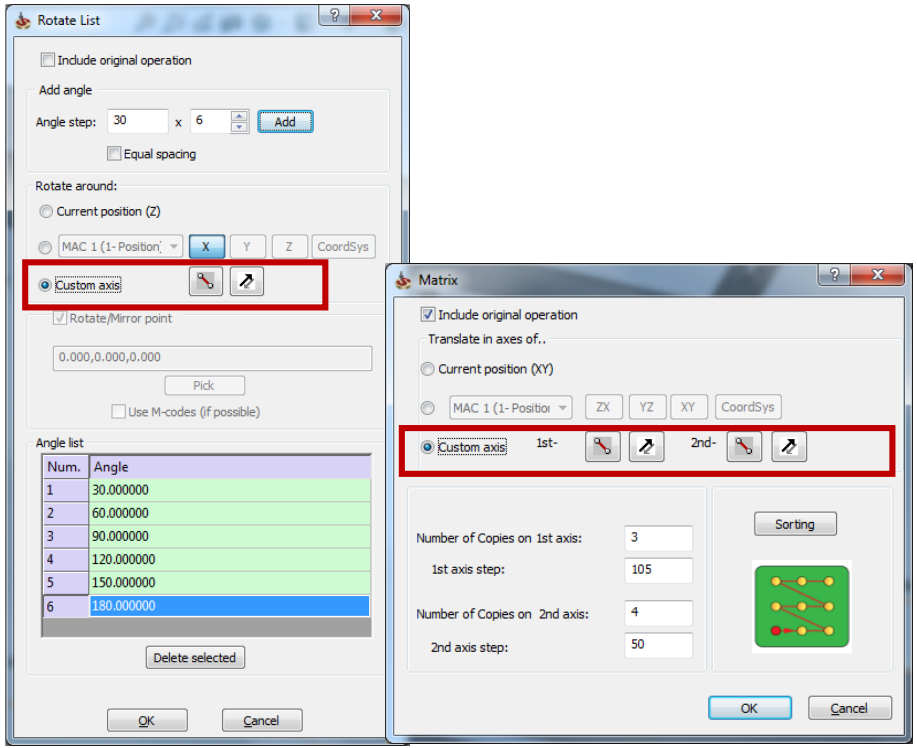
Transformation

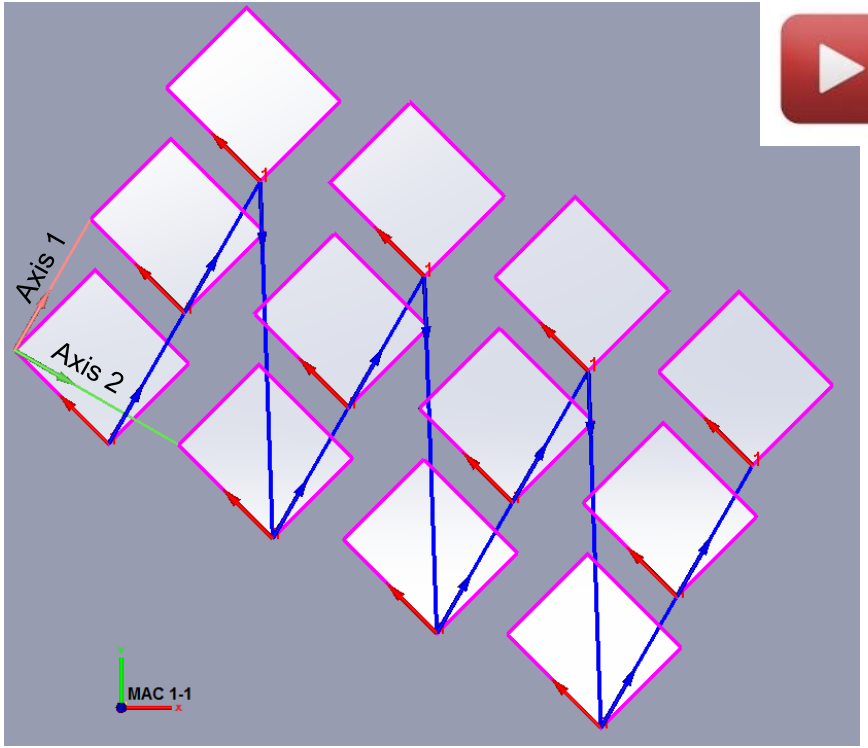
Transform: Selection of custom transformation direction (CoordSys)



Use axes of another CoordSys for transformation directions definition

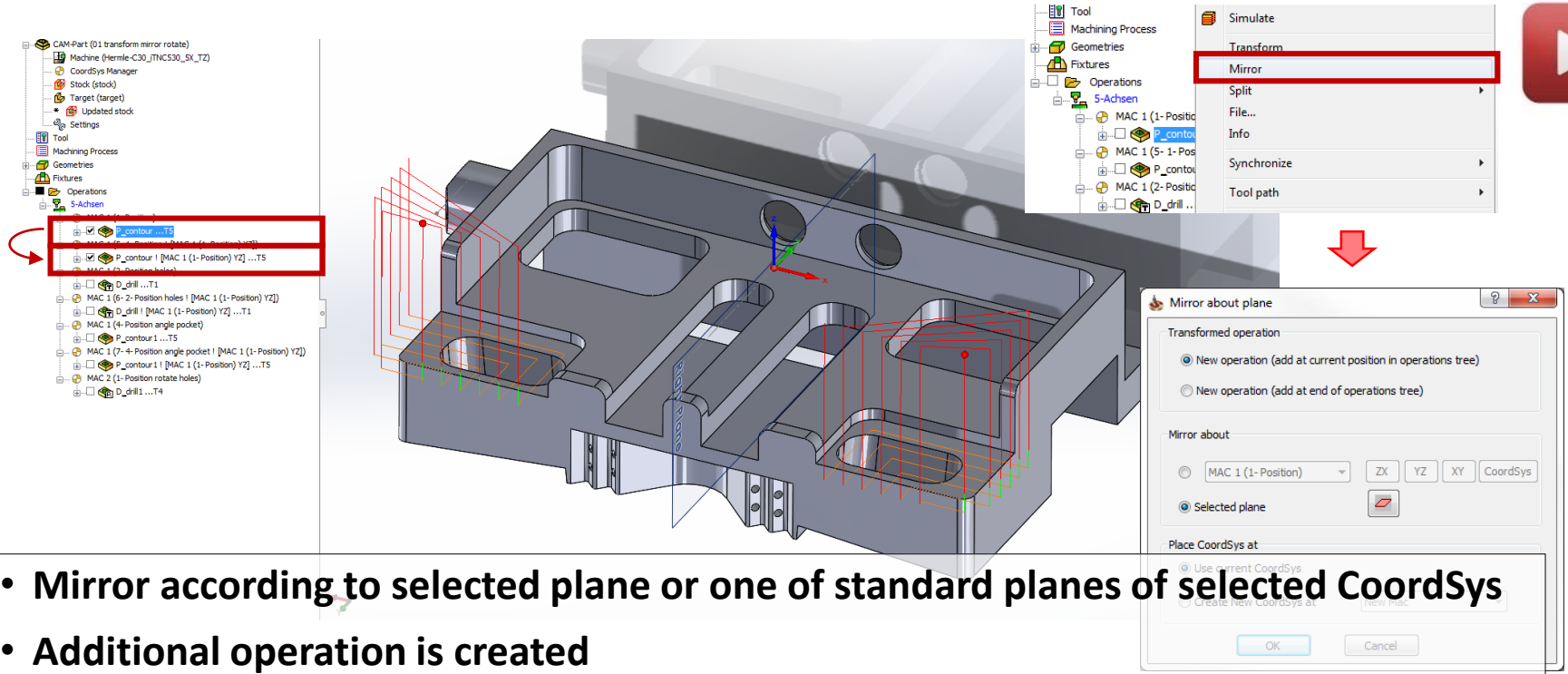
Transform: Selection of custom transformation direction (Vector)





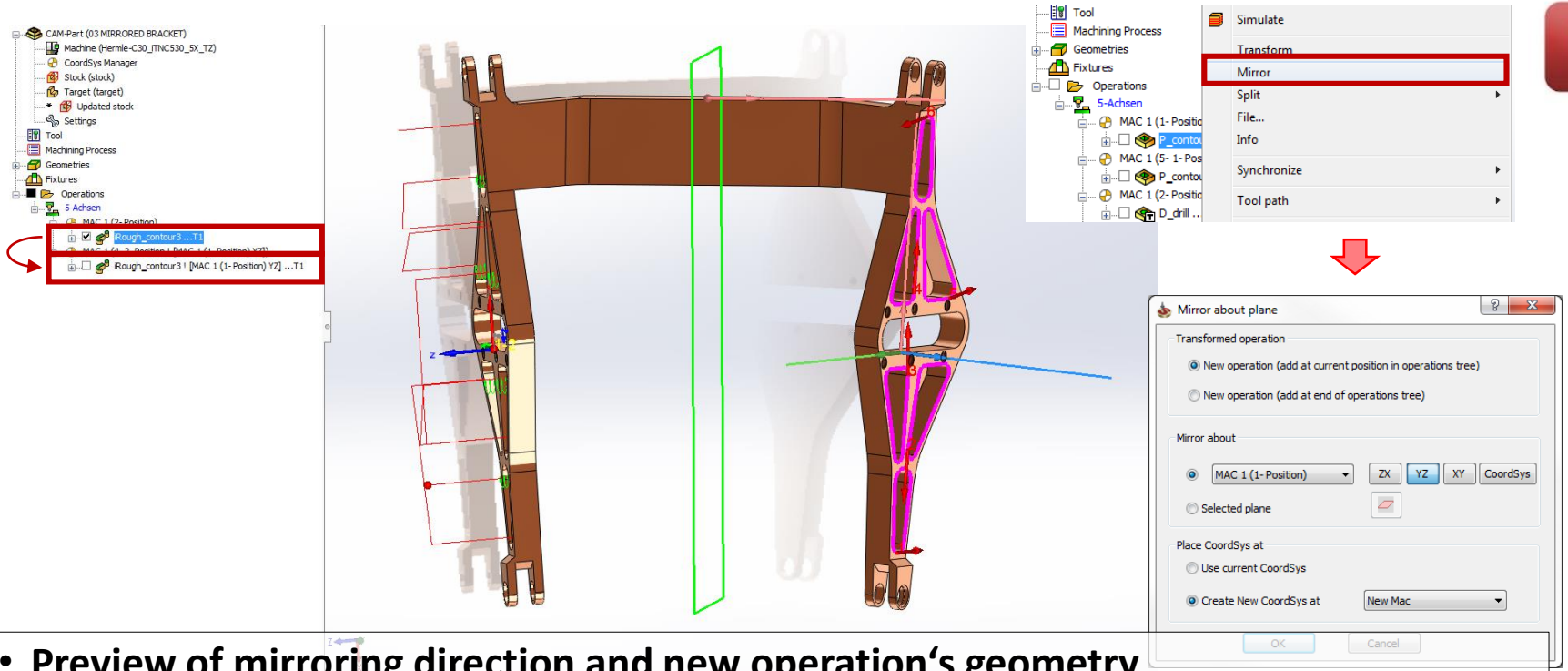
Use custom axes for definition of transformation directions

Transform: Mirror



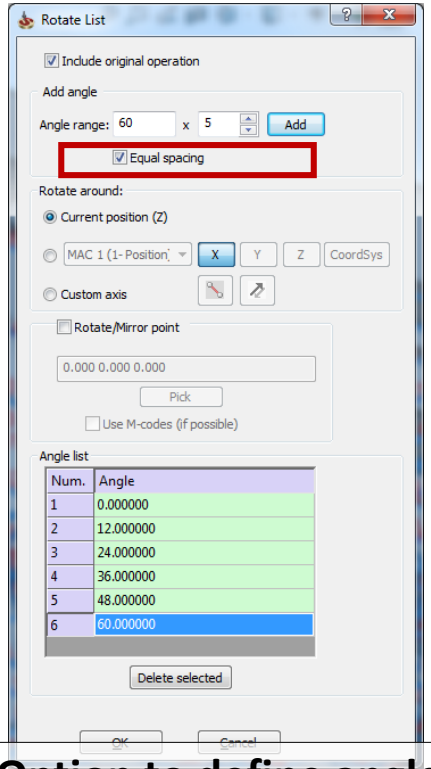
- **Mirror according to selected plane or one of standard planes of selected CoordSys**
- **Additional operation is created**
- **Keep cutting direction (climb/conventional)**

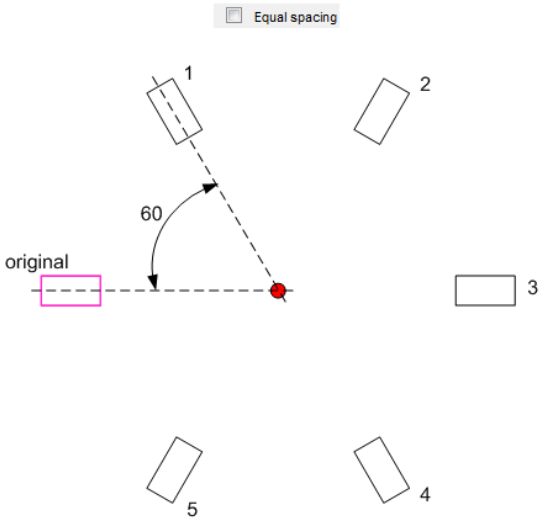
Transform: Mirror

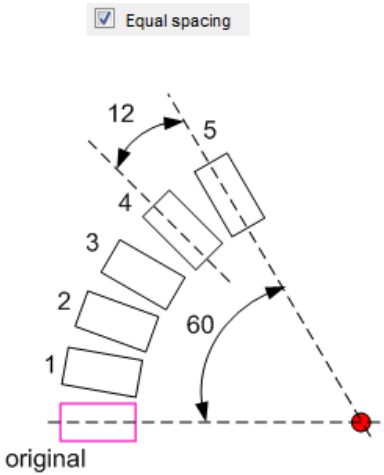


- **Preview of mirroring direction and new operation‘s geometry**
- **Additional CoordSys can be created if necessary**

Transform: Equal spacing in Rotate transformation

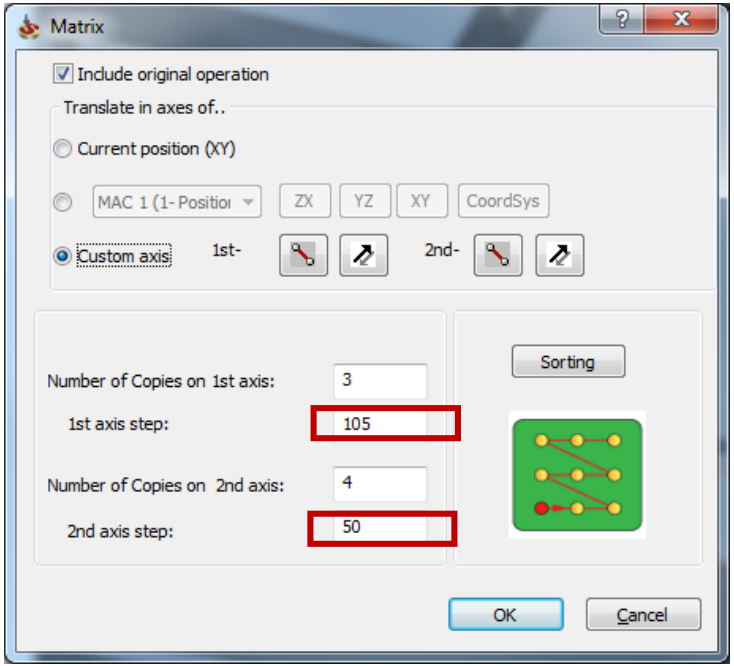


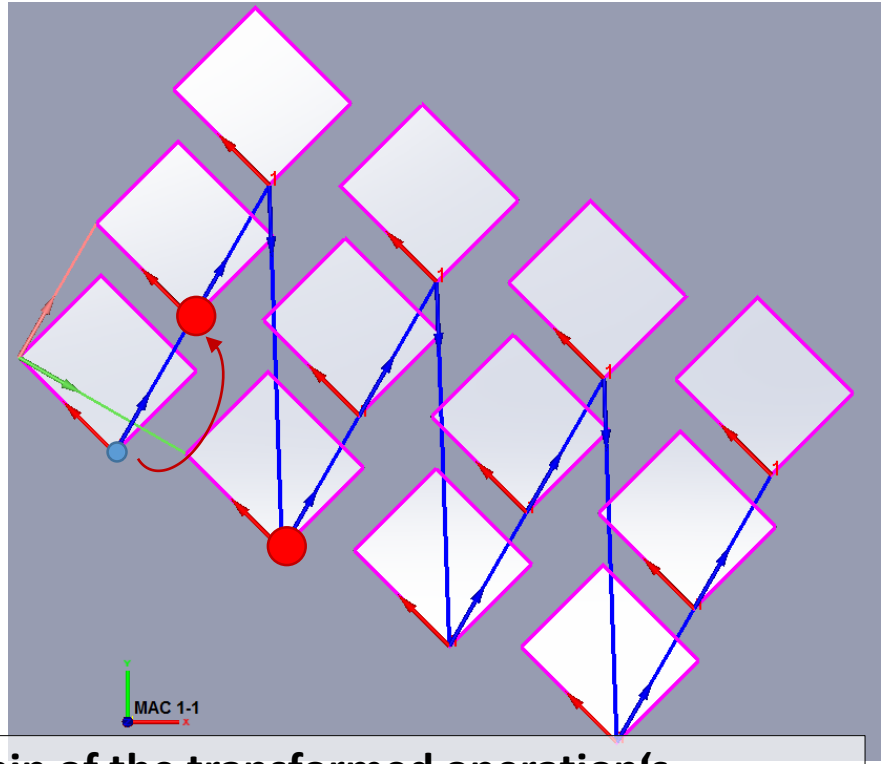




- **Option to define angles for translation by angle range and amount of step**

Transform: Pick matrix step from the model

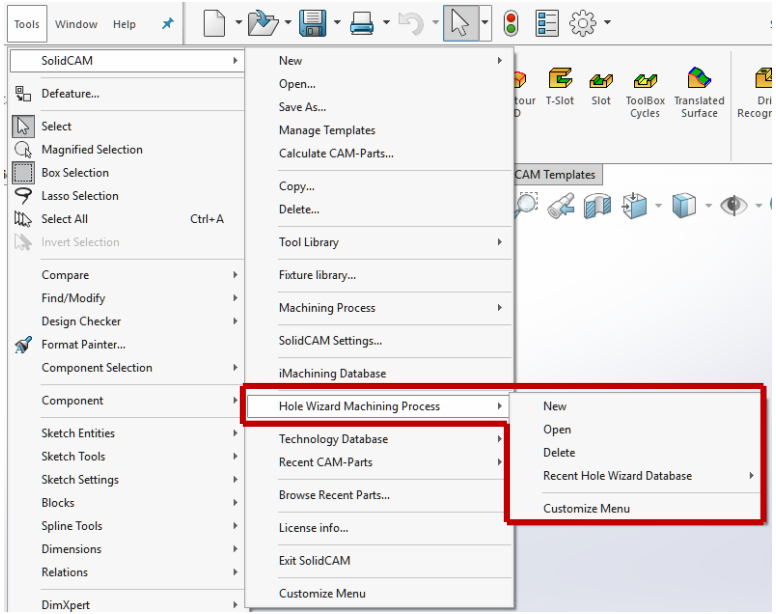


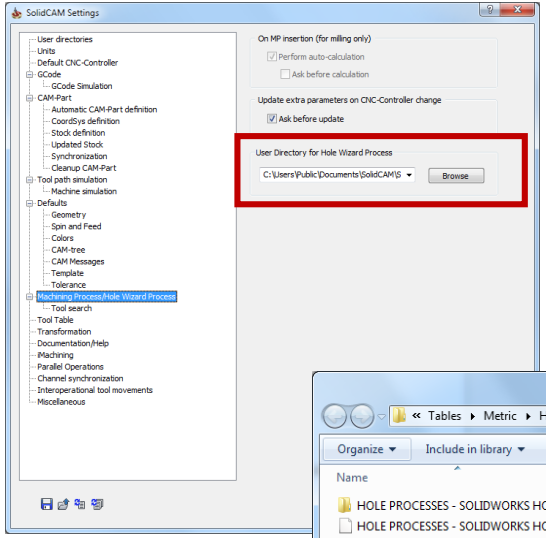


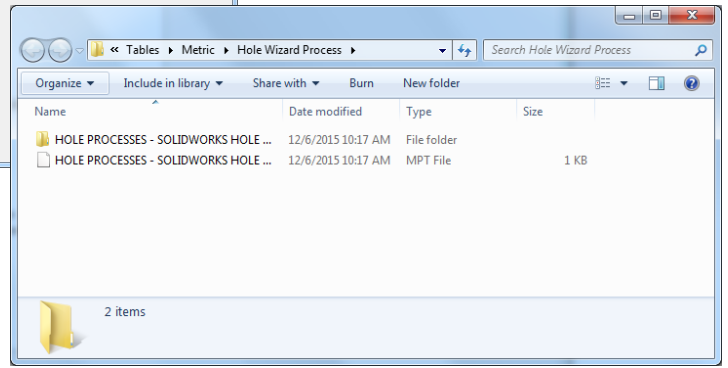
- **Pick the point where the start of first chain of the transformed operation‘s geometry should be ➔ it is taken as a step in Matrix transformation**

Hole Wizard

Hole Wizard: Separate folder

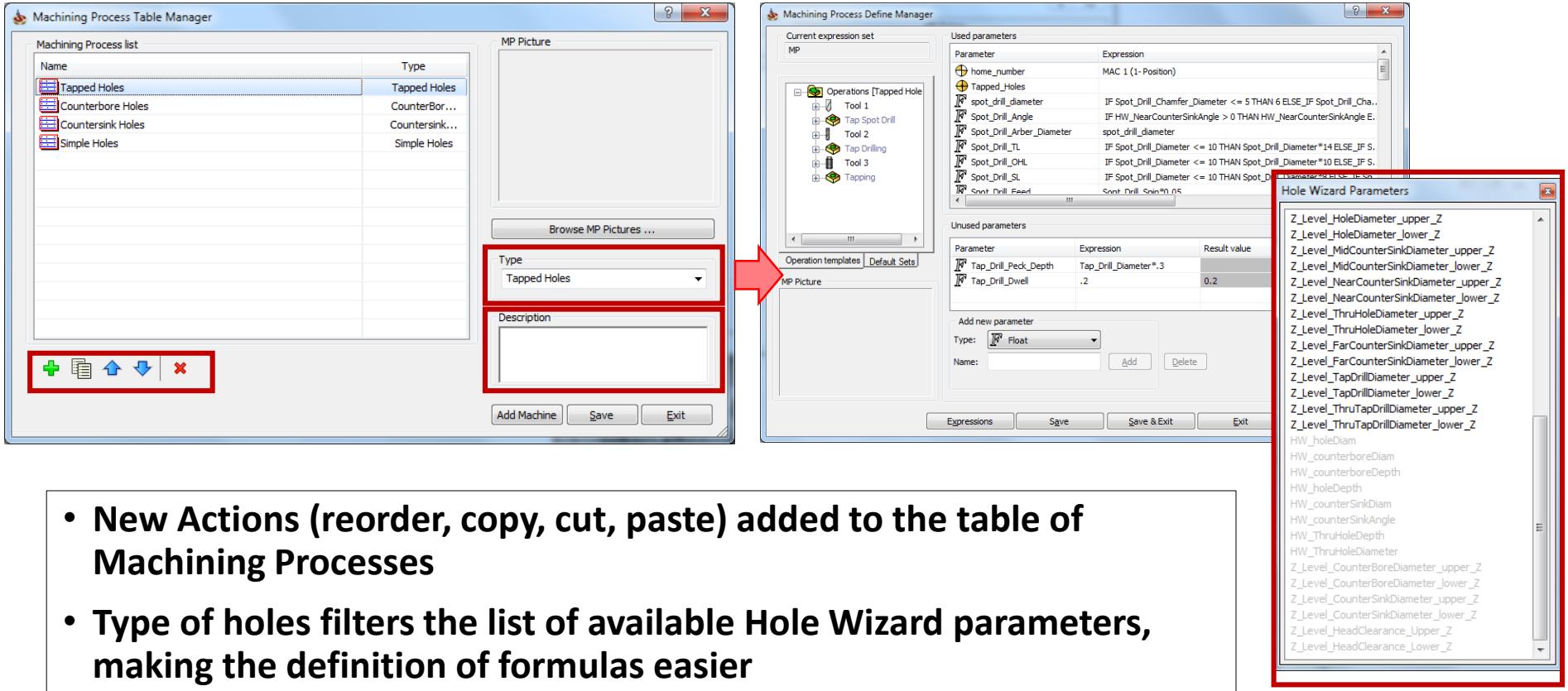






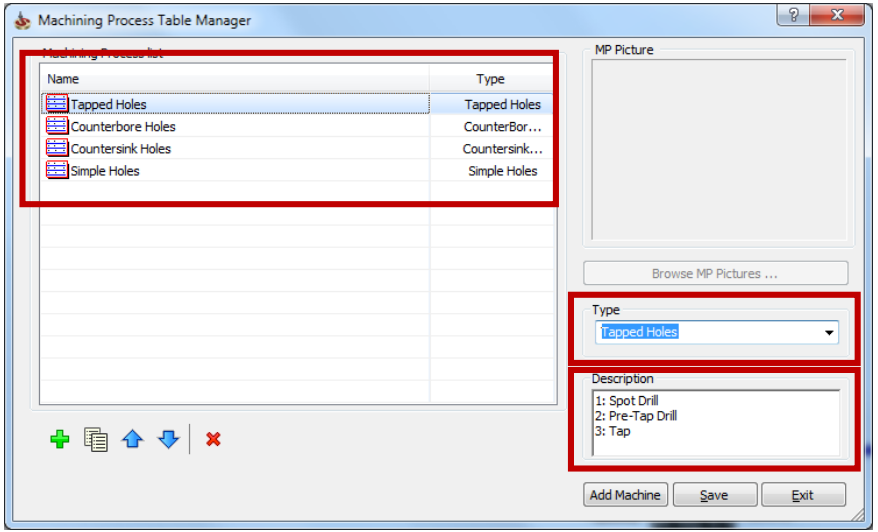
- **Separate folder for Hole Wizard Machining Process files**

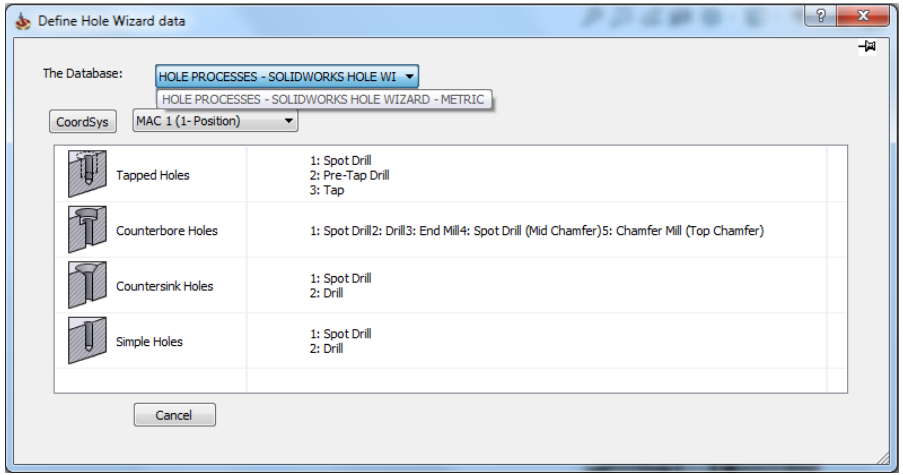
Hole Wizard: Customization



- **New Actions (reorder, copy, cut, paste) added to the table of Machining Processes**
- **Type of holes filters the list of available Hole Wizard parameters, making the definition of formulas easier**

Hole Wizard: Enhanced User Interface

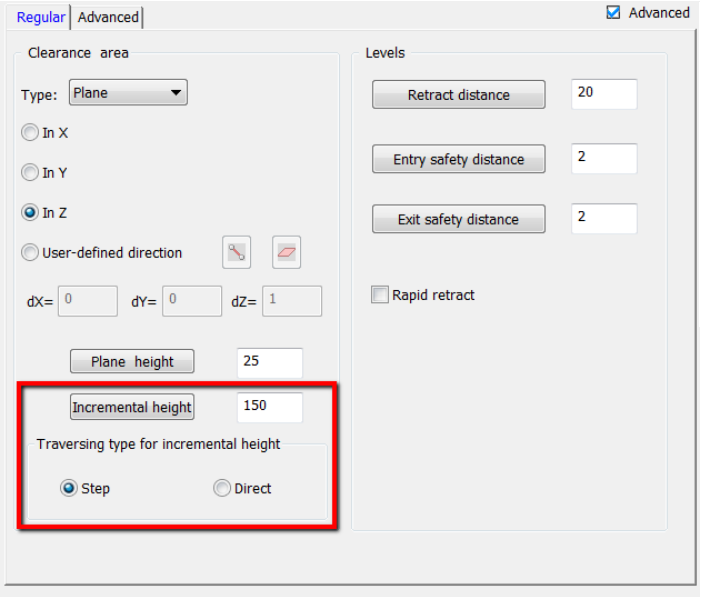


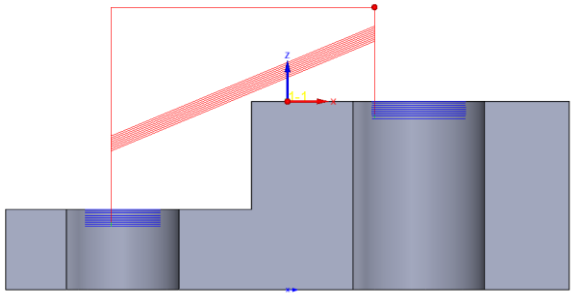


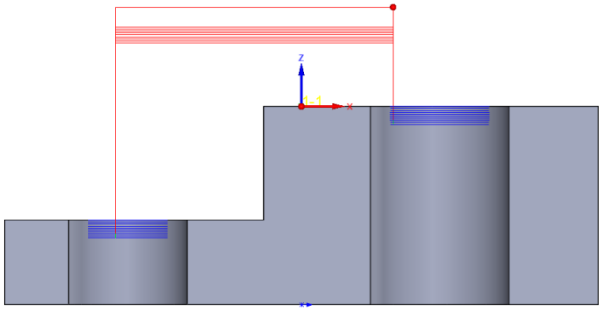
- **Combo box of Databases contains only DBs compatible with current machine (= have the same Drilling cycles)**
- **Description is added in order to make selection of the Machining Process easier**

Sim 5X & HSS

Incremental Clearance Plane

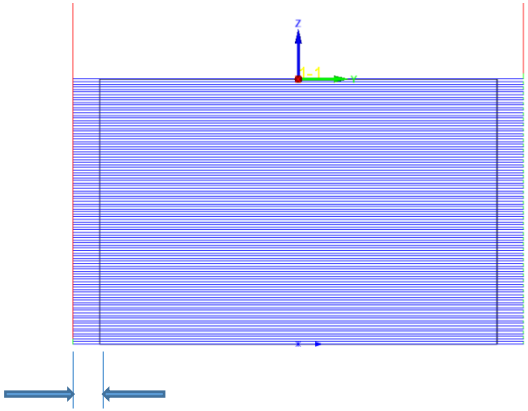




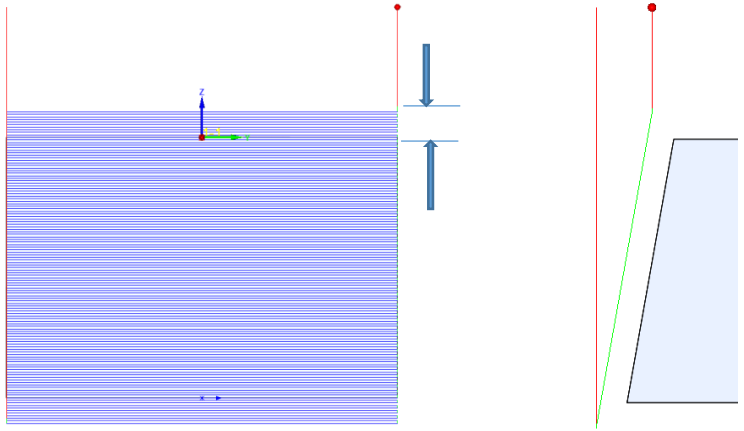


- **Internal moves can now use an Incremental plane rather than Clearance plane**
- **Moves can be directly linked or linked through step**

Tangential Extensions



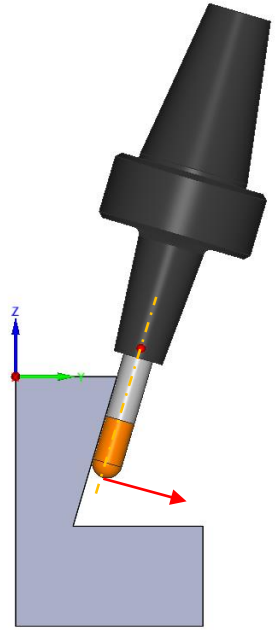
Extension in 2015
Along Cutting Direction

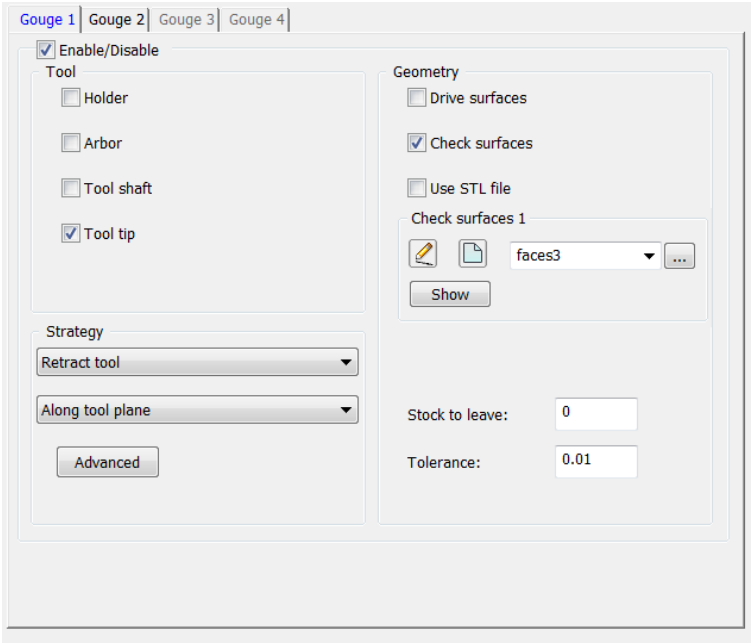


New Extension in 2016
Across cutting direction

- **Toolpath can now be extended in both directions**
- **No need to create physical extension of surfaces to extend toolpath**

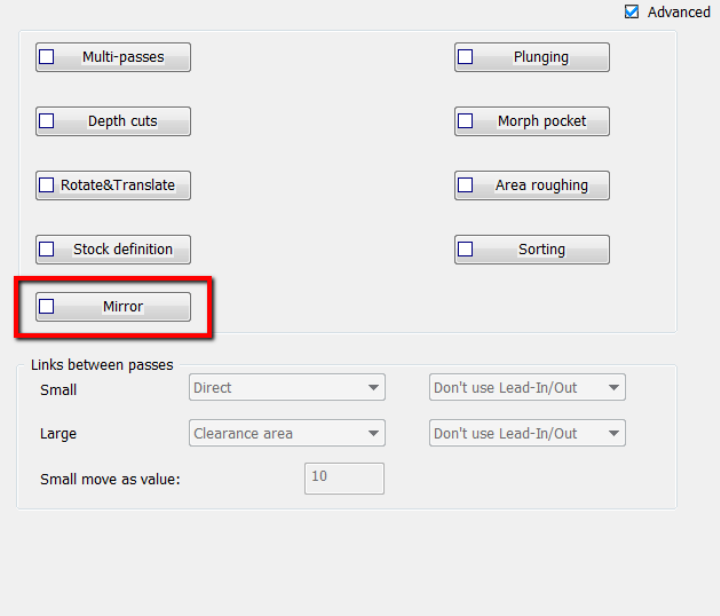
Gouge Check – Retract Along Tool Plane

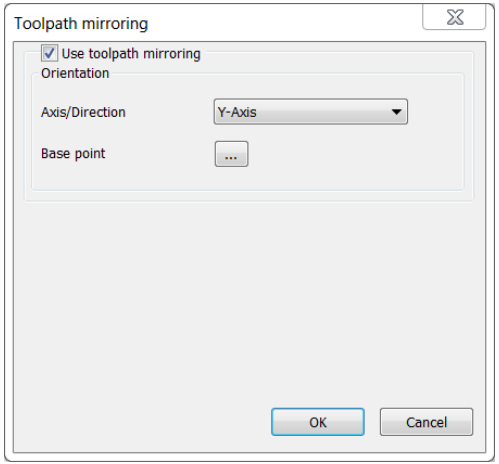


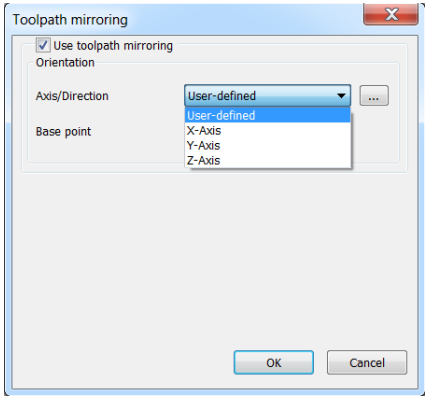


- **New option to move tool away from Collision zone in a direction orthogonal to tool axis**

Mirror Toolpath

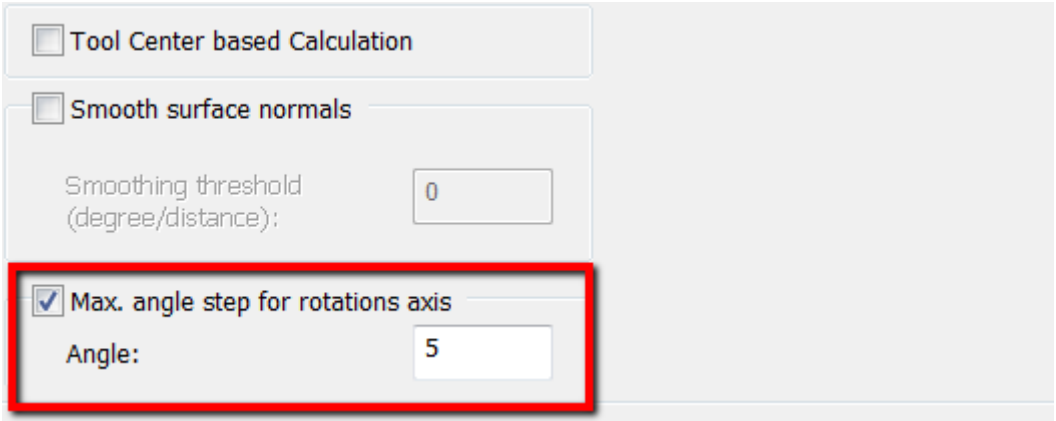






- **New option to mirror HSS & SIM5X toolpath around any selected axis**

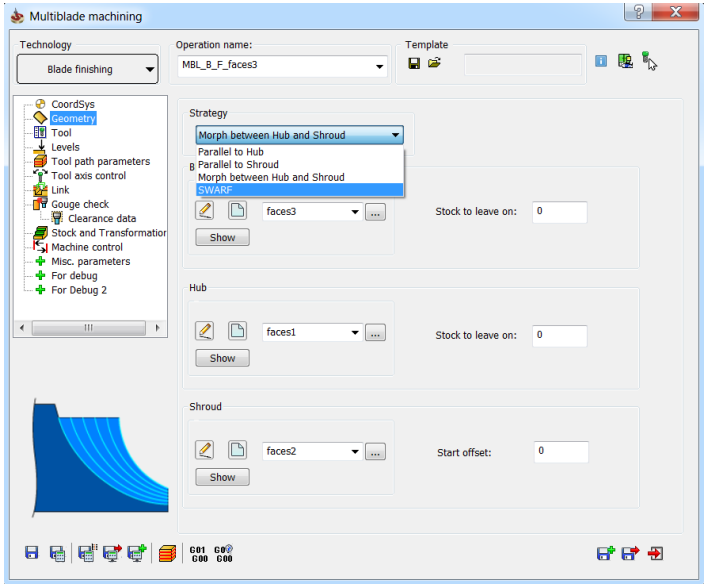
Max Step Angle – Rotation Axis

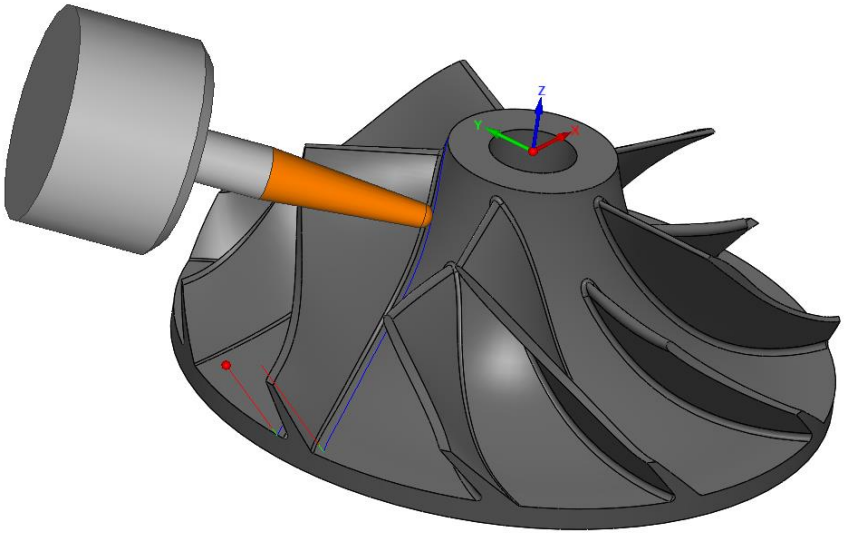


- **When rotary or tilting is bigger than the max angle defined here, new points are added in between, in order to ensure that max angle is respected both for tilt angle and rotary angle**

Sim 5X - Multiblade Machining

Blade Finishing - Swarf

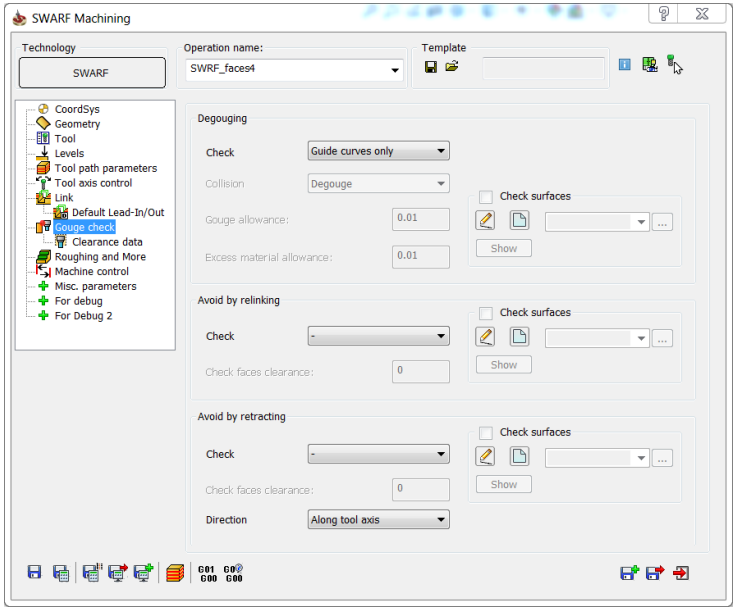


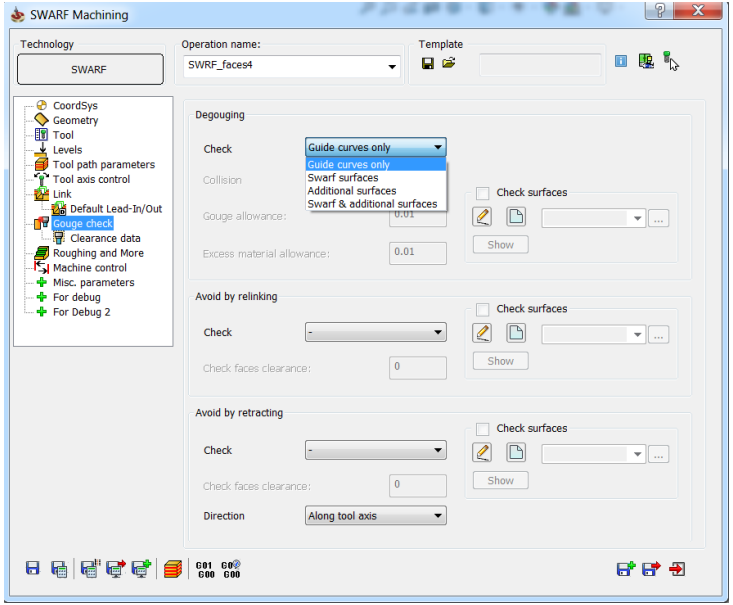


- **This strategy applies flank milling to finish the blade with a single cut**
- **Basic gouge check options are available to avoid gouging**

Sim 5X - SWARF

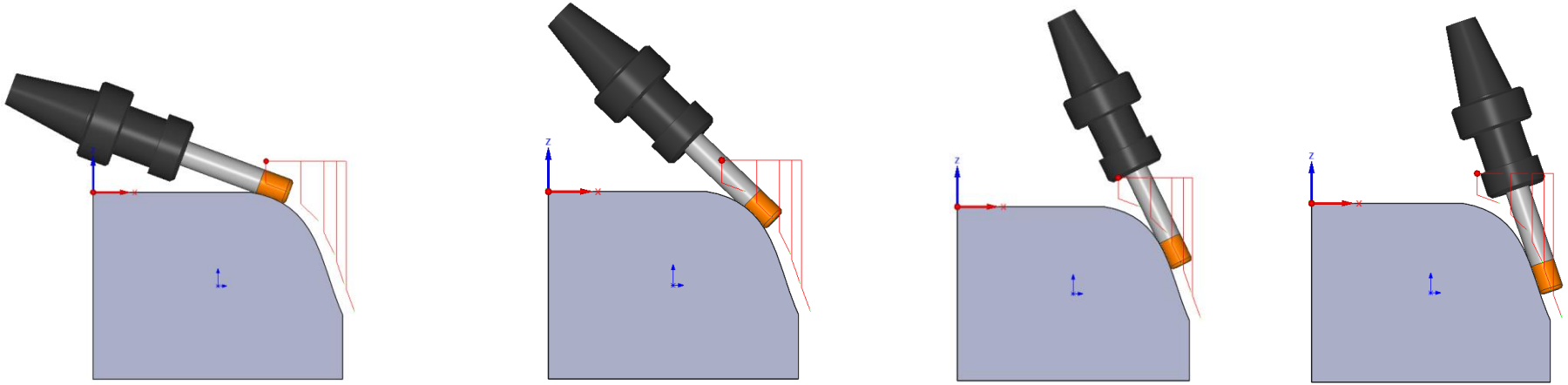
Gouge Checking





- **New option for gouge detection – Guide curves checking only**
- **Gouge check GUI is simplified and logical**

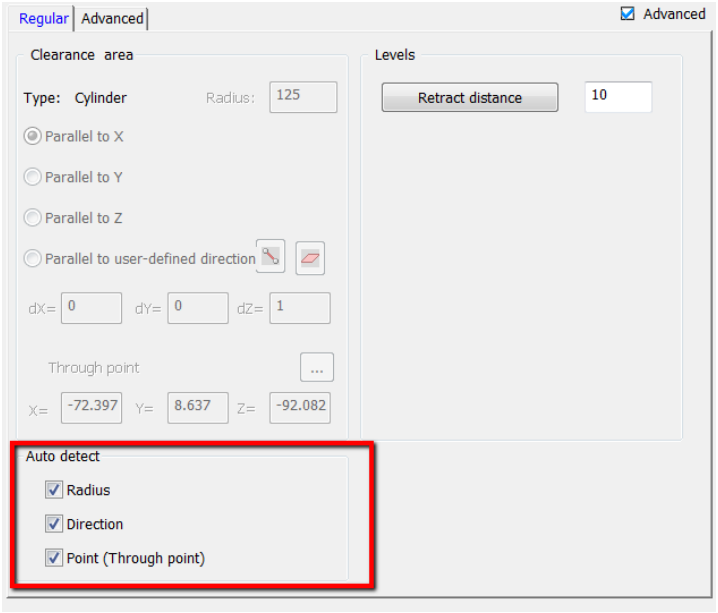
MultiCuts – Follow Surface Topology

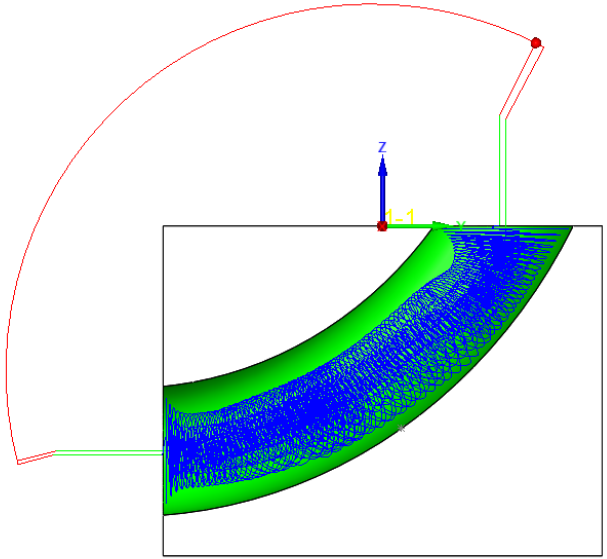


- **The aim is to create multiple cuts that follow the actual curvature of the machining surfaces**
- **Main benefit will be the machining of convex shapes such as gear flanks or pressure sides from impeller blades.**

Sim 5X - Port Machining

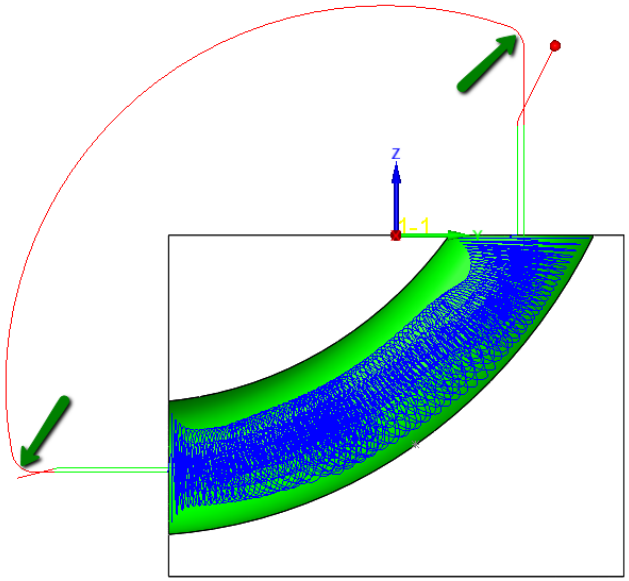
Clearance Area – Autodetect

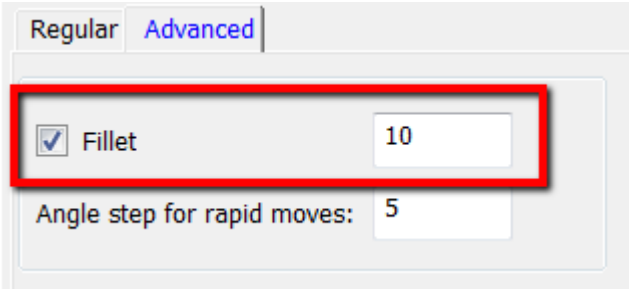




- **Auto detect the direction of Cylinder Axis , Radius on cylinder & axis center point for easy definition of retracts**

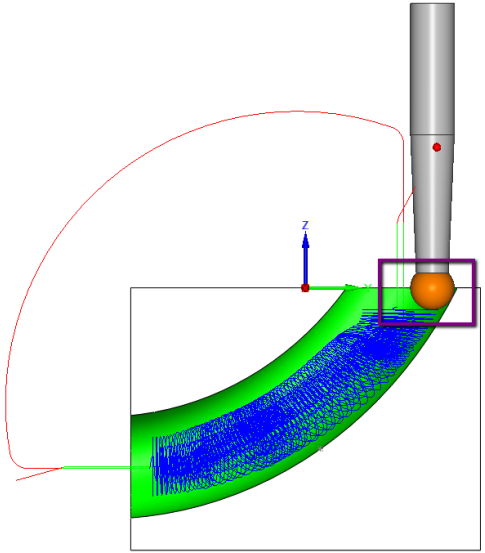
Fillets during Retract

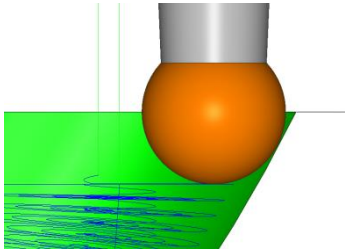


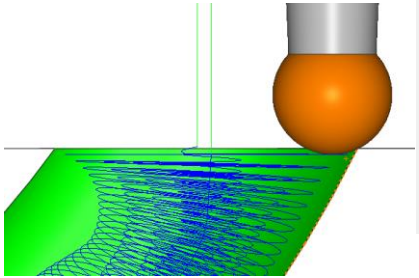


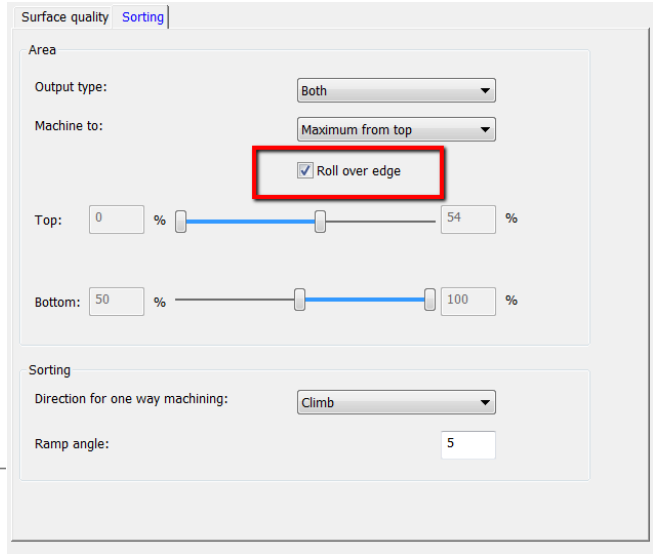
- **Rounding of sharp corners in retracts for smooth machine movements**

Roll Over Edge





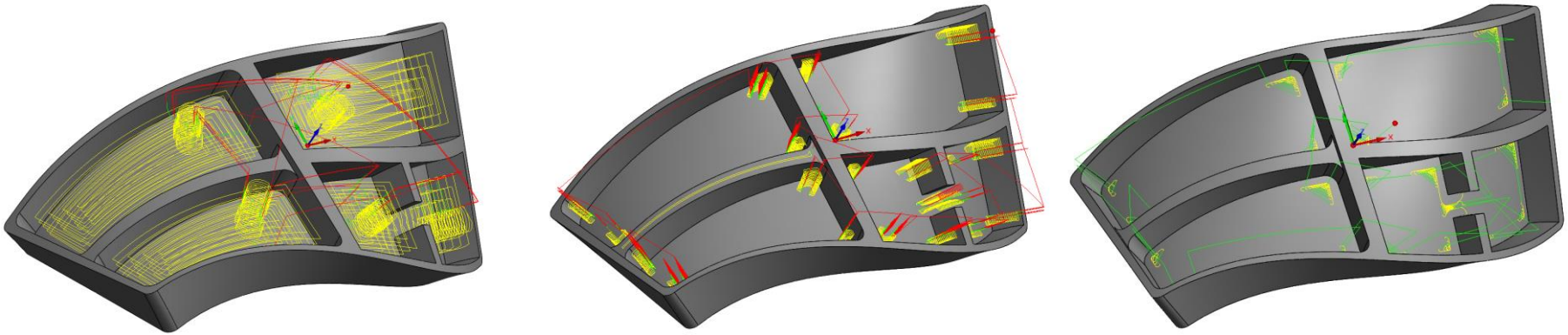




- **Edge rolling will create a tool path extension such that the tool approaches and enters the port smooth and gradual**
- **The flute cuts out material step by step from the tip and is not in full contact with the material on full diameter**

MultiAxis Roughing

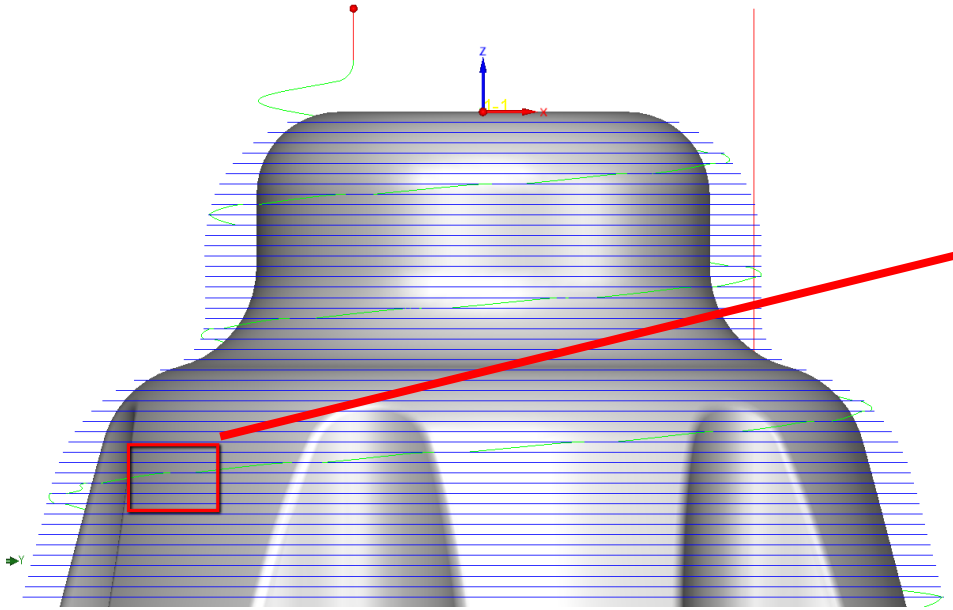
MultiAxis Roughing – Rest Rough

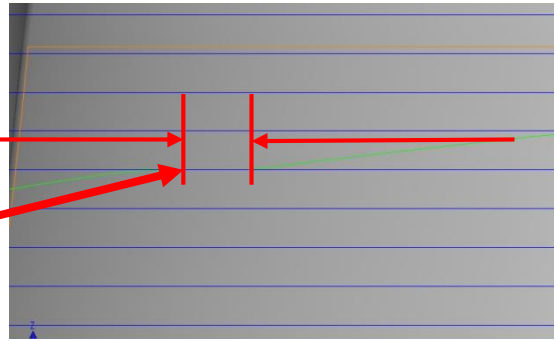


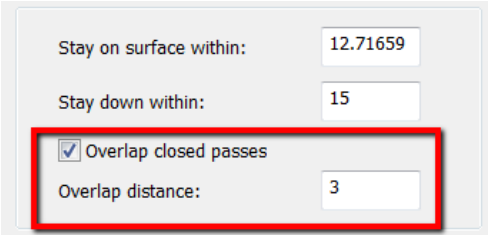
- **This option calculates a tool path that will remove all the non-machined areas left by previous large roughing tool**
- **The rest roughing tool path is based on previous roughing tool diameter, radius and offset**

HSM

Overlap Passes

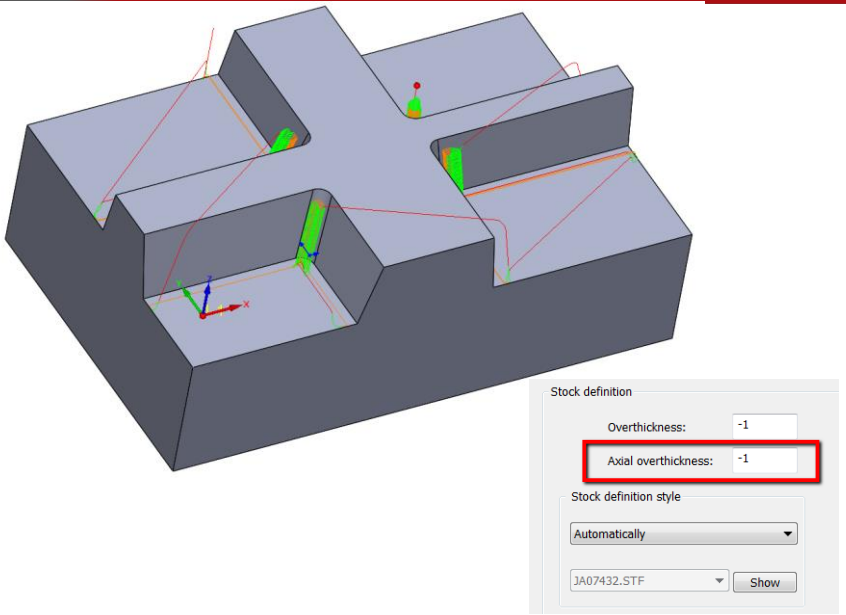


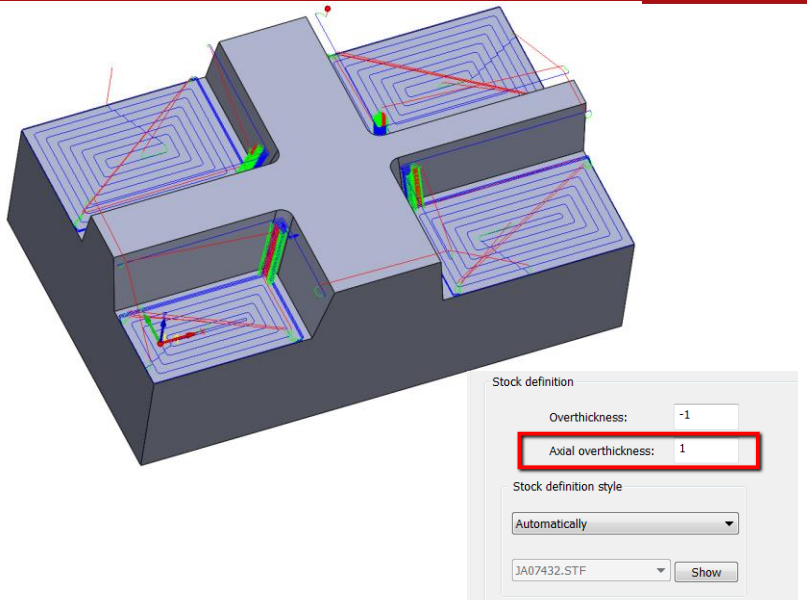




- **New parameter added to give a better quality finish as the entry and exit moves of individual passes are never coincident**

Axial Overthickness

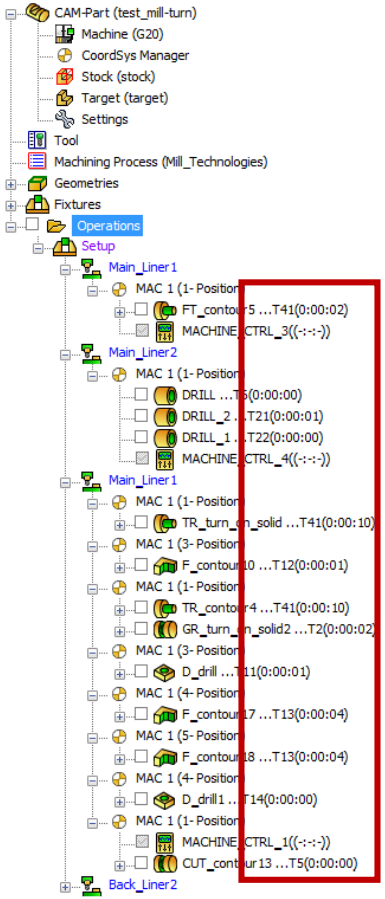


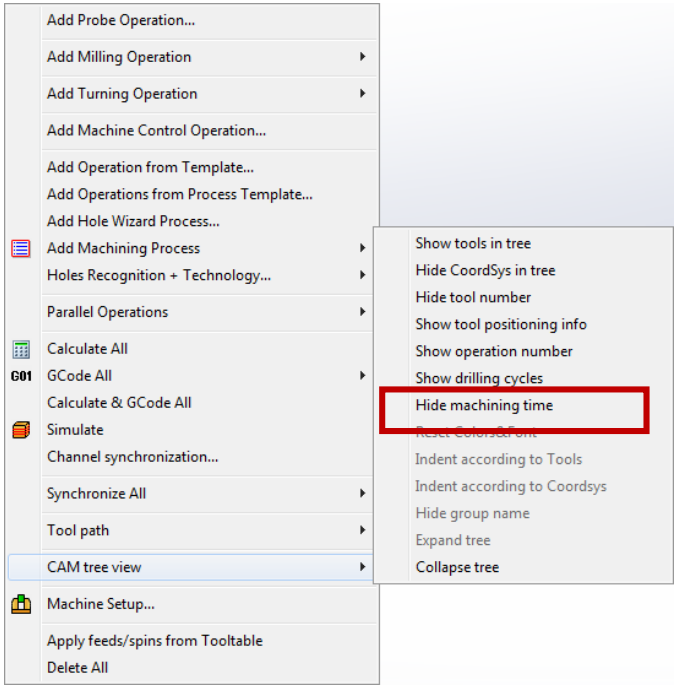


- **Axial overthickness** is an additional Vertical thickness added to the model. A negative value will cause the system only to preserve passes that are below the surfaces or stock model by the specified amount, while a positive value will select all passes that are within the specified distance from the surfaces or stock model.

CAM tree

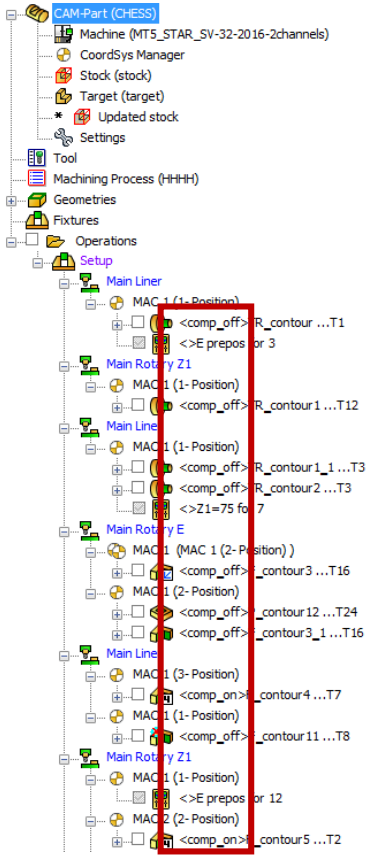
CAM tree: Show machining time

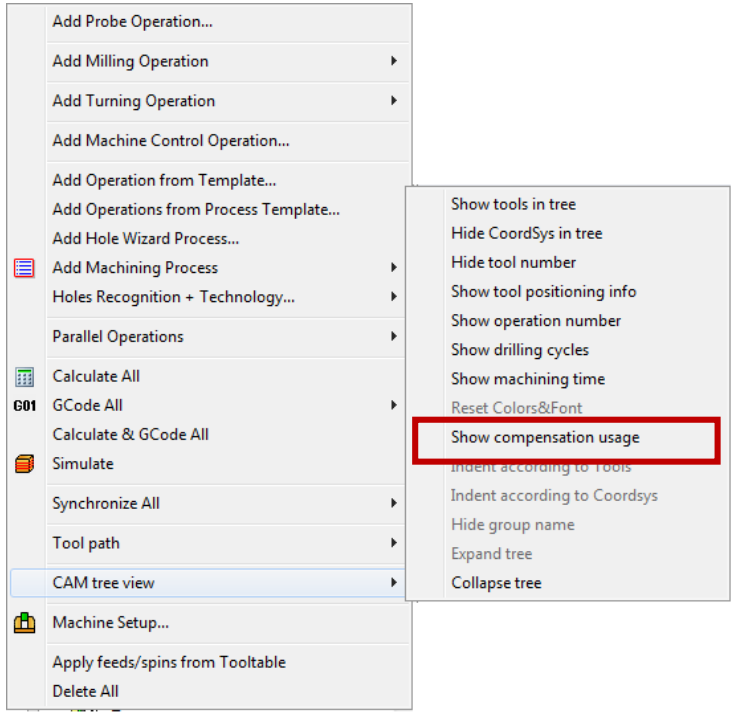




Show machining time in CAM tree

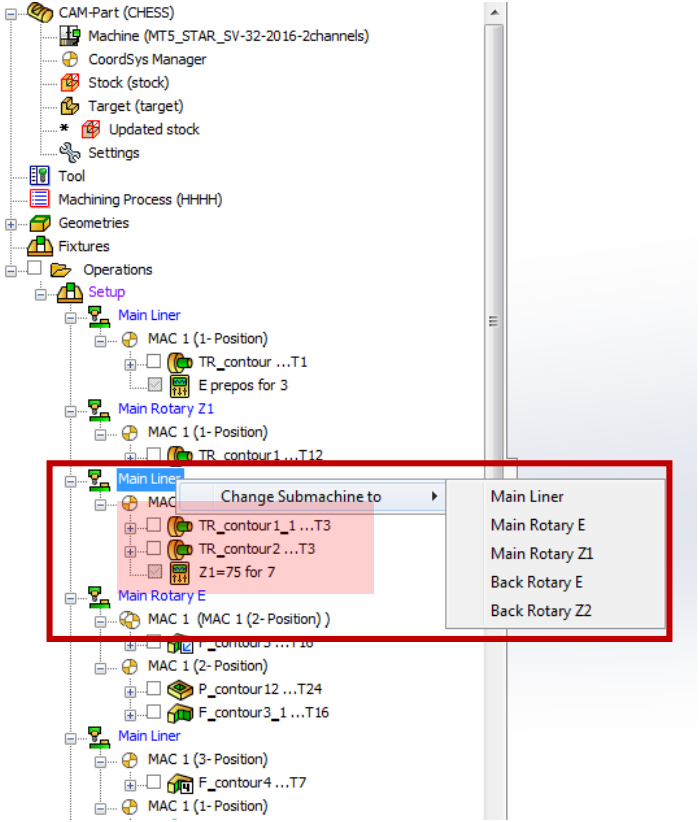
CAM tree: Show information about compensation usage





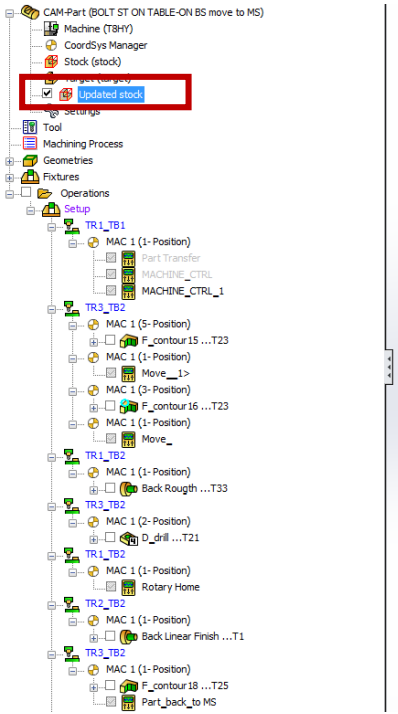
Show indicator whether compensation is used in the operation or not

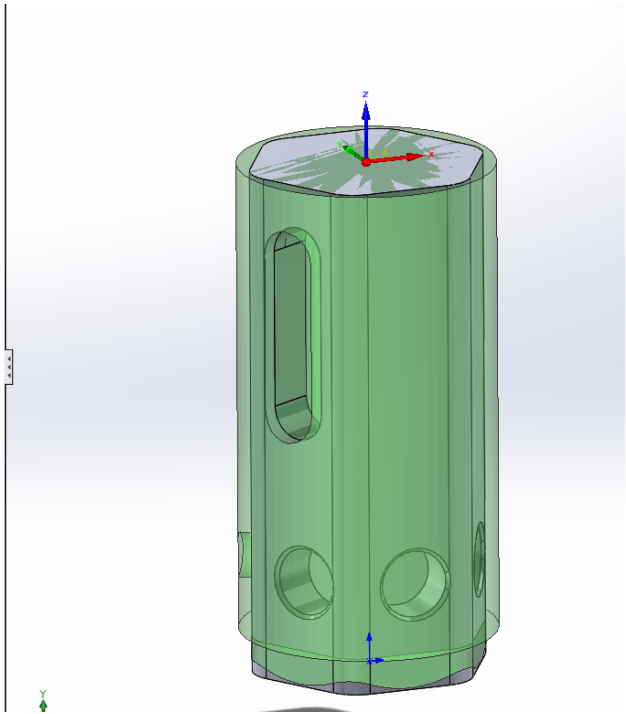
CAM tree: Change Submachine from the CAM-tree



Right click on the submachine item in the CAM tree allows to change submachine in all operation between selected submachine and the next one in the CAM tree

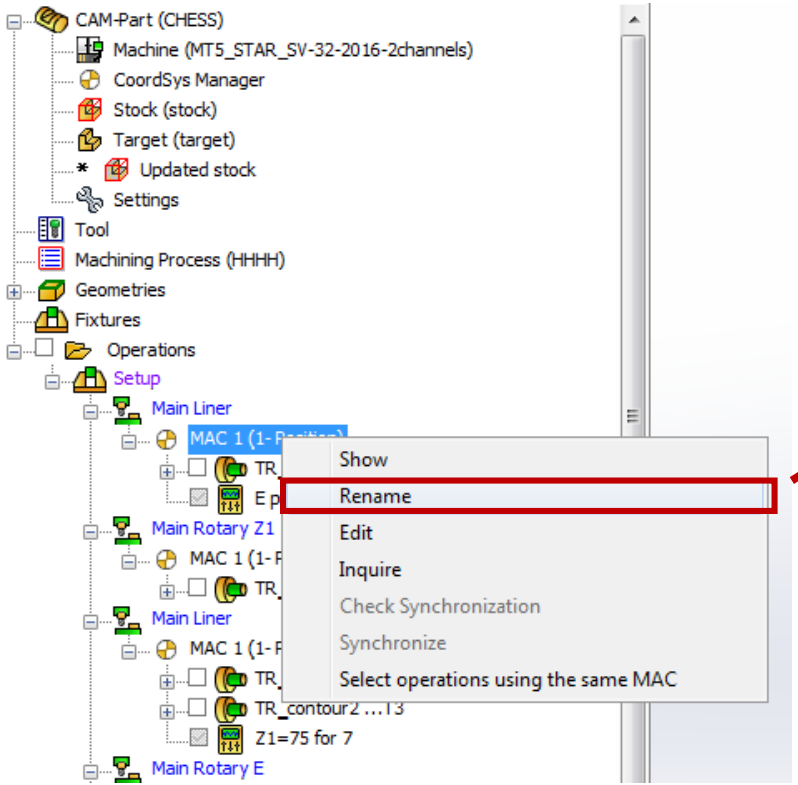
CAM tree: Show updated stock

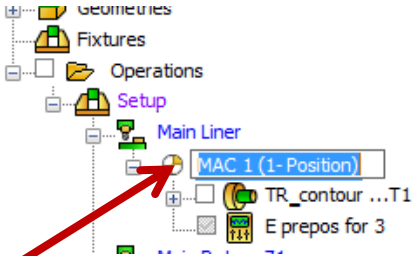




- **Option to see rest material left after the last operation during new operations definition.**
- **Preview in CAD area**
- **Color and transparency are taken from Host CAD simulation settings**

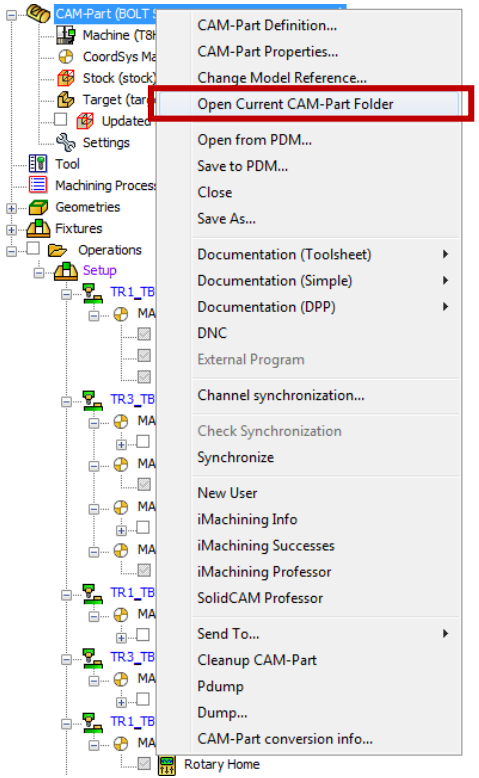
CAM tree: Rename CoordSys

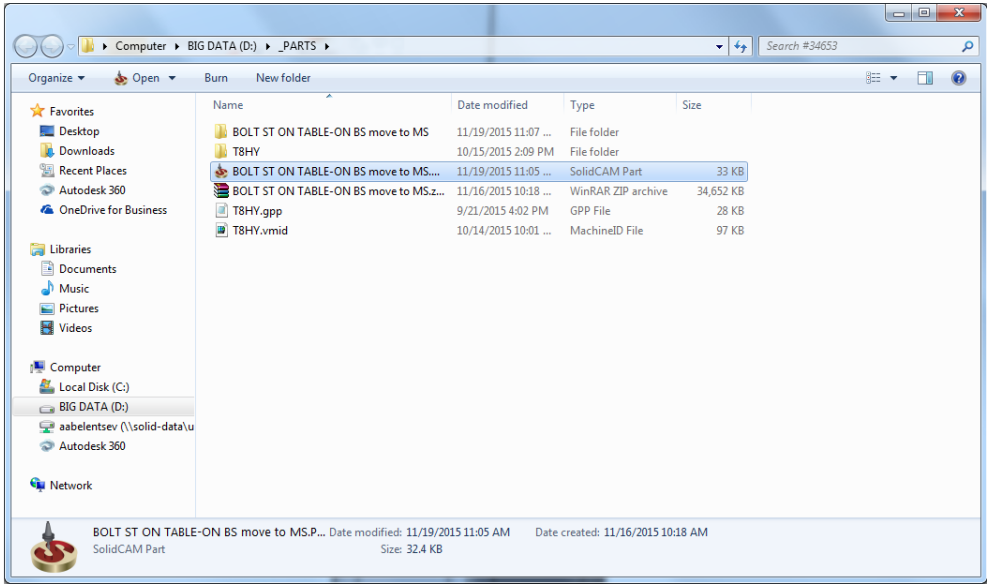




Possibility to rename CoordSys (MAC/Position) directly from the CAM tree

CAM tree: Open Current CAM-Part folder

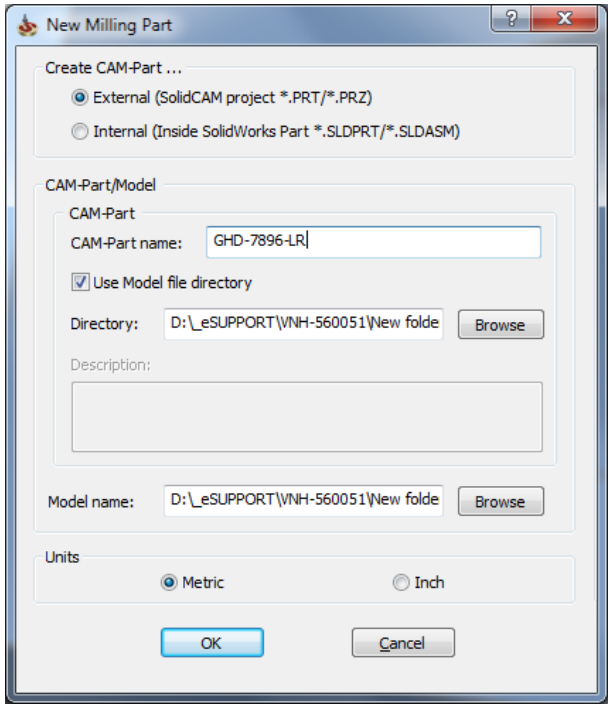


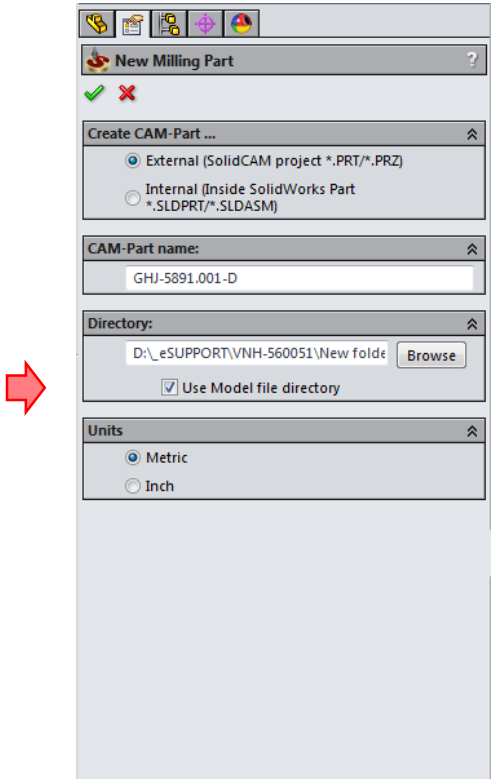


Reach the folder containing the current CAM-Part with a single click

General

Integration: More SolidWorks-integrated dialogs

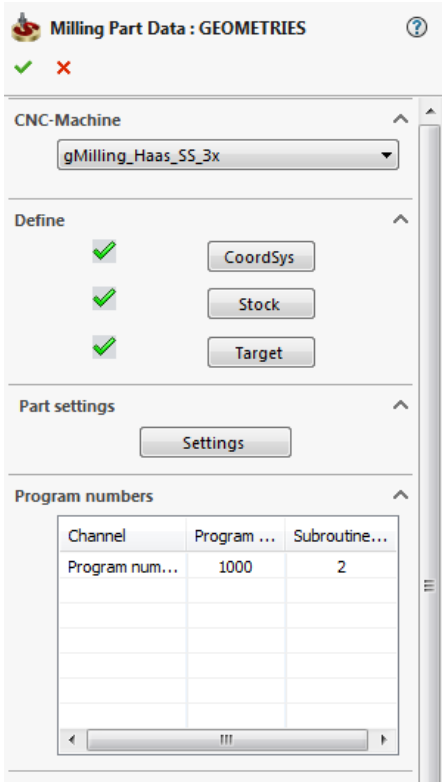




Dialogs integrated in SolidWorks Feature manager:

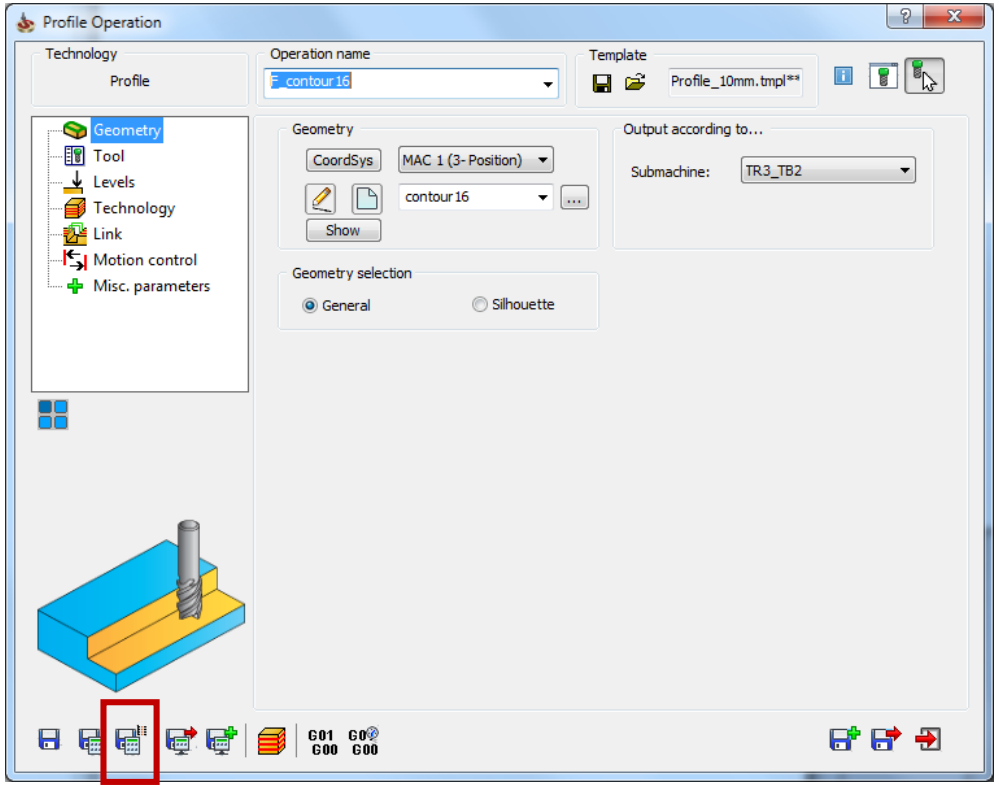
- **New CAM-part**
- **CoordSys Definition**

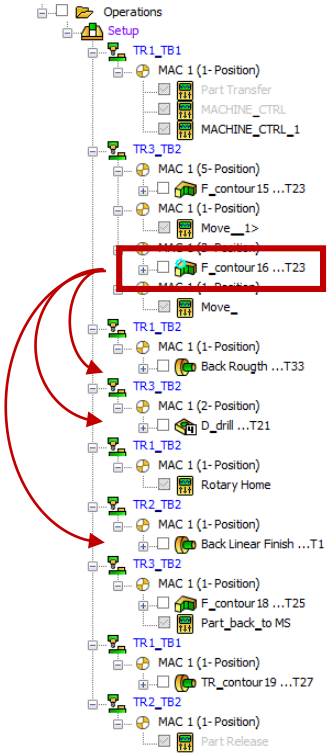
CAM-Part Definition: Program Numbers in Table format



Program Numbers shown in a table view to support single and multi-channel machines.

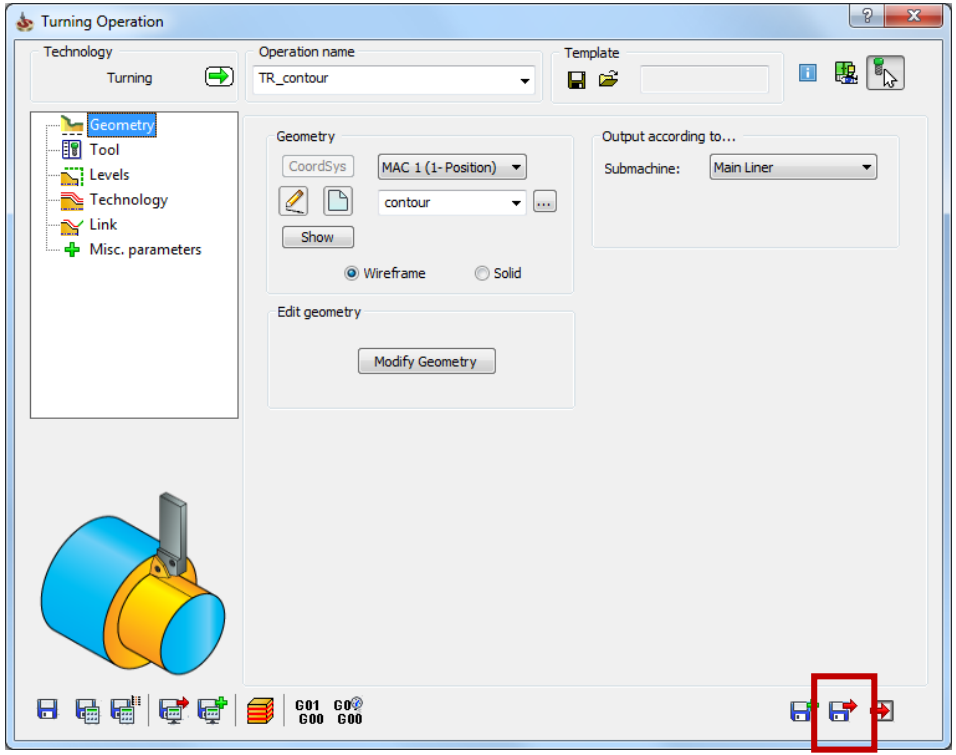
Milling operations: Calculate with related operations





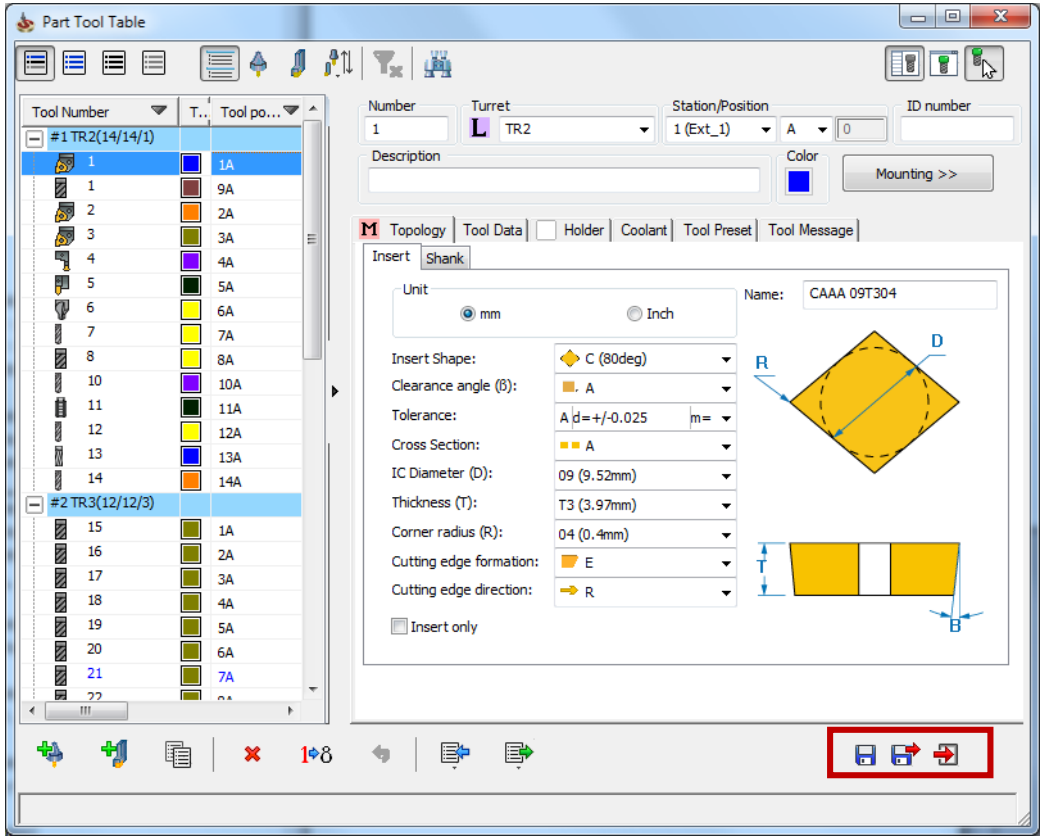
Option to calculate current operation and all following dependant ones

Operations: Save & Exit button



Button to save operation and exit without calculation

Tooltable: Save Tooltable without closing

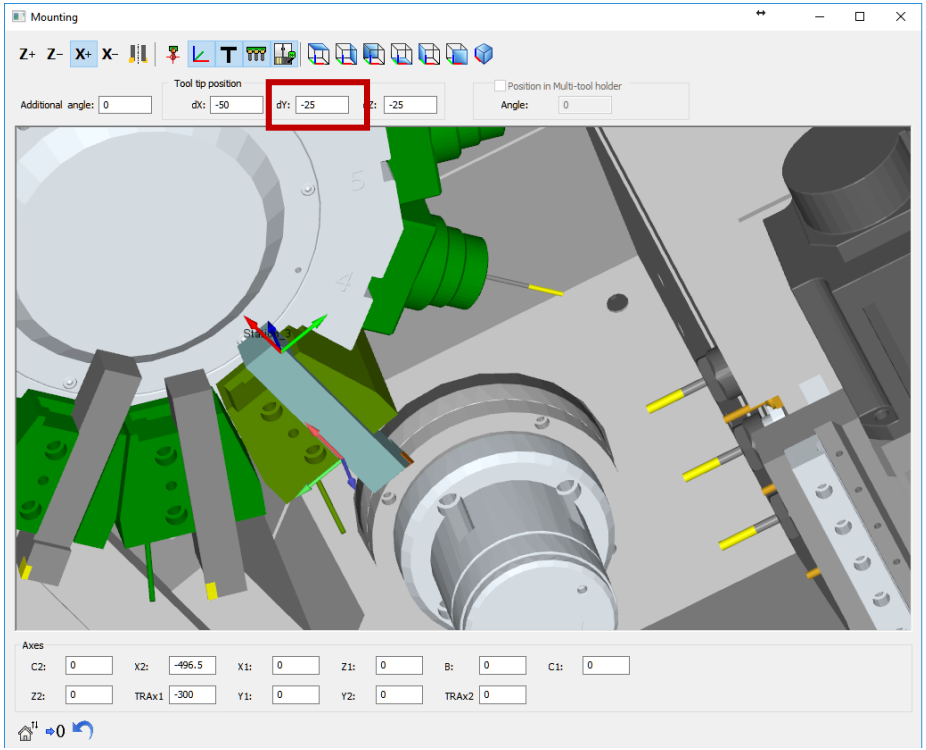


3 new buttons in tooltable:

- **Save**
- **Save and Exit**
- **Exit**

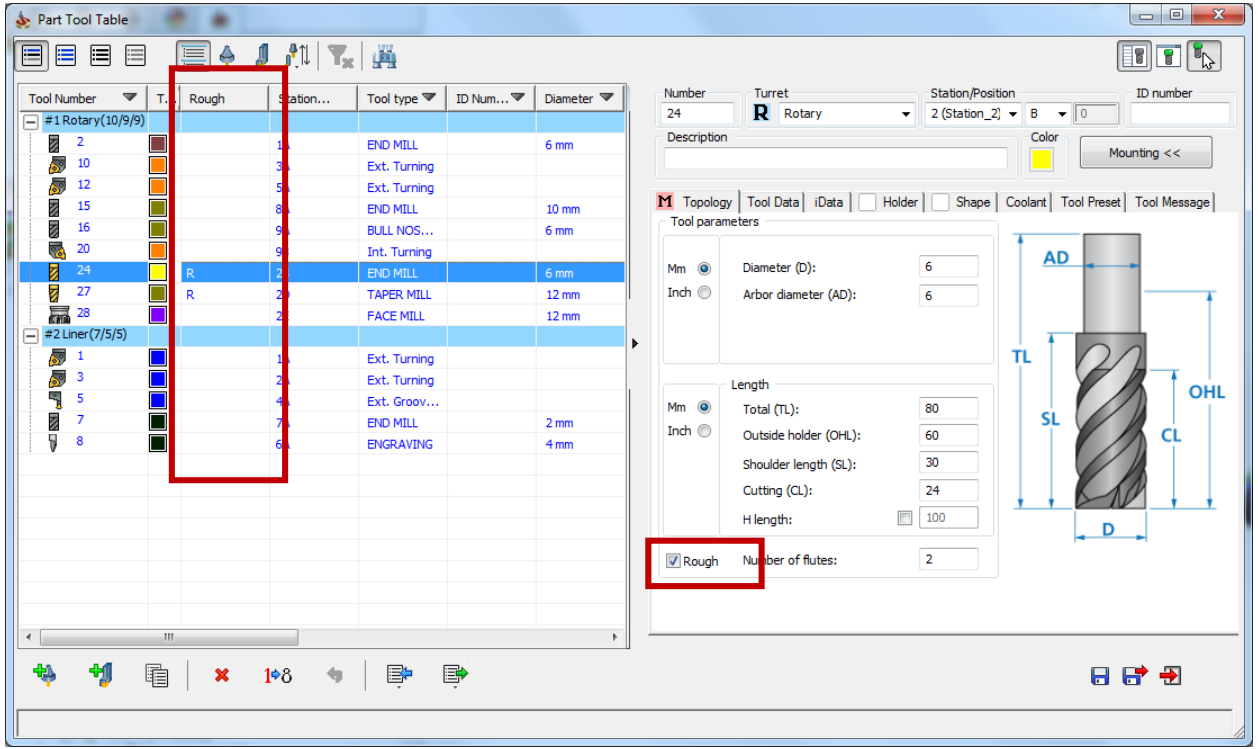
*Now there is an option to save the tooltable without closing the dialog.

Tooltable: dY tool tip position shifting



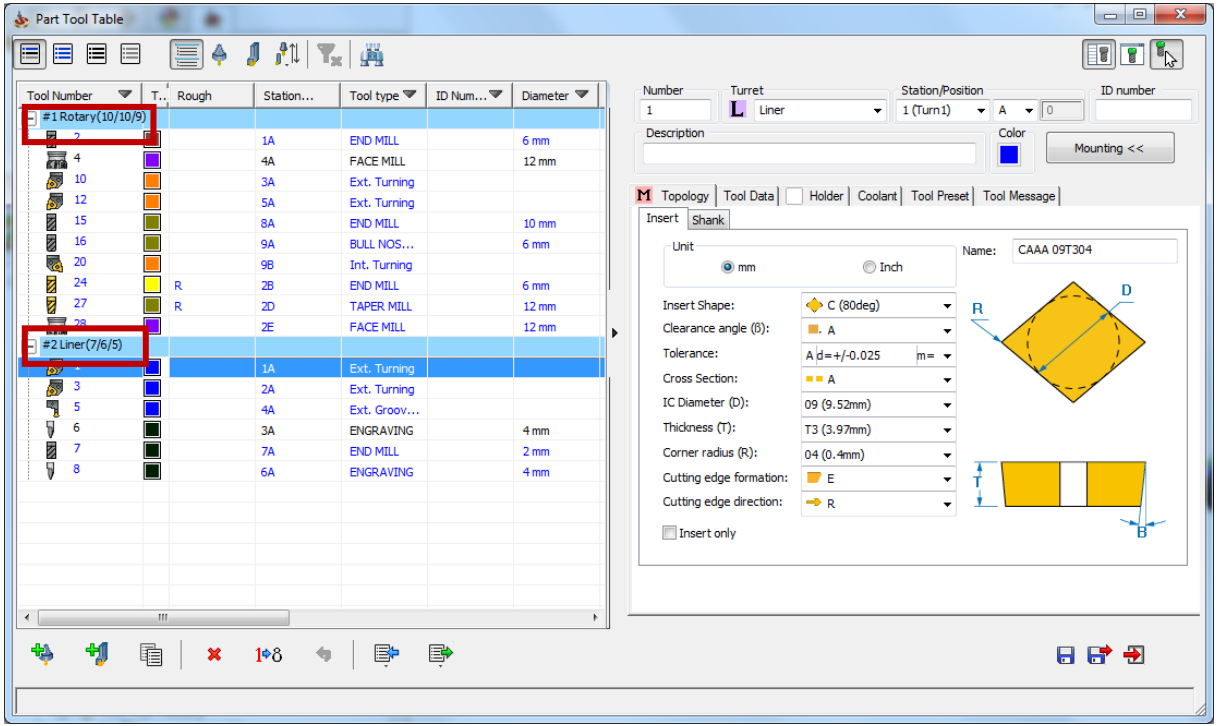
In addition to dX and dZ values, now there is a possibility to define dY coordinate of tool tip in Station's CoordSys as well

Tooltable: “Rough” option to tooltable



Additional information in tooltable about tool for Rough machining only

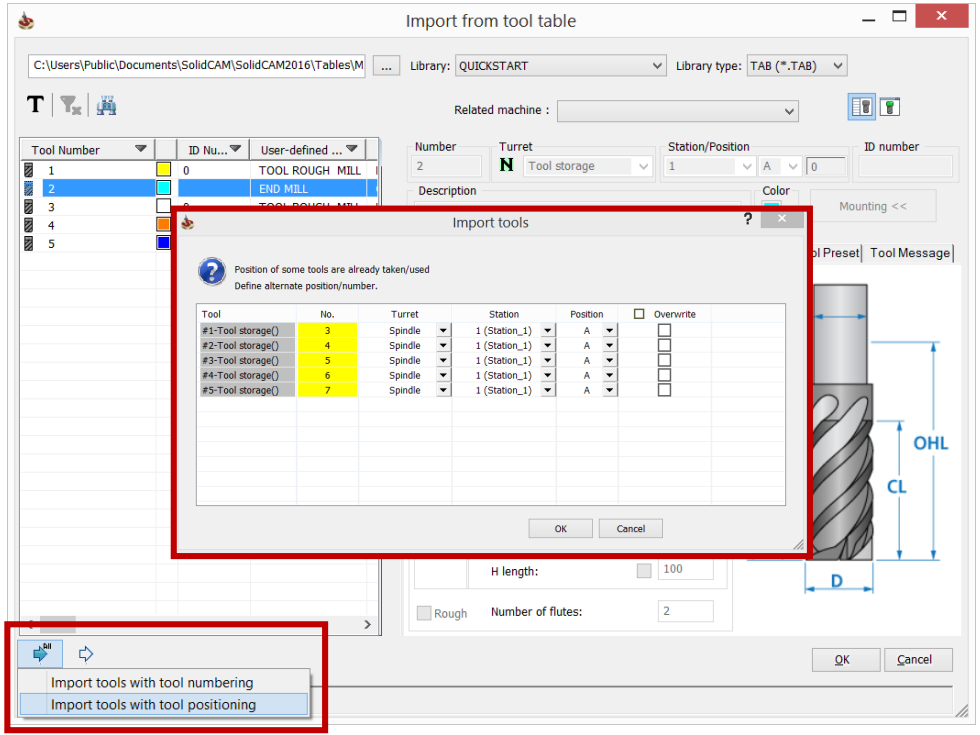
Tooltable: Tools quantity information



Information about the tools quantity in turret title row in the following format:

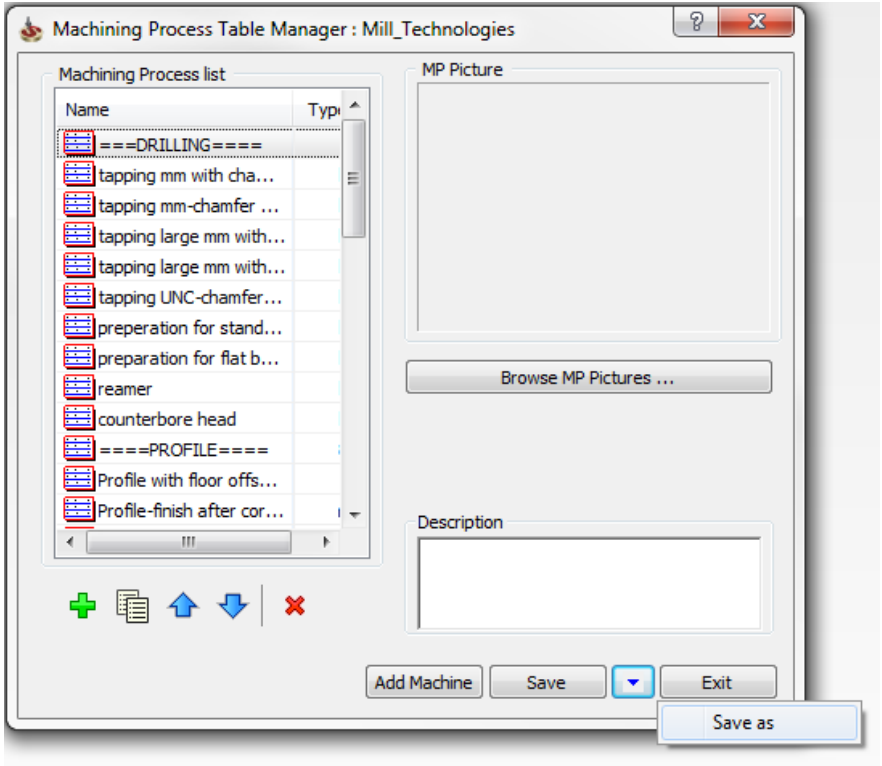
#turretID TurretName (number_of_stations/mounted_tools/used_tools)

Tooltable: Import with Positioning Manager



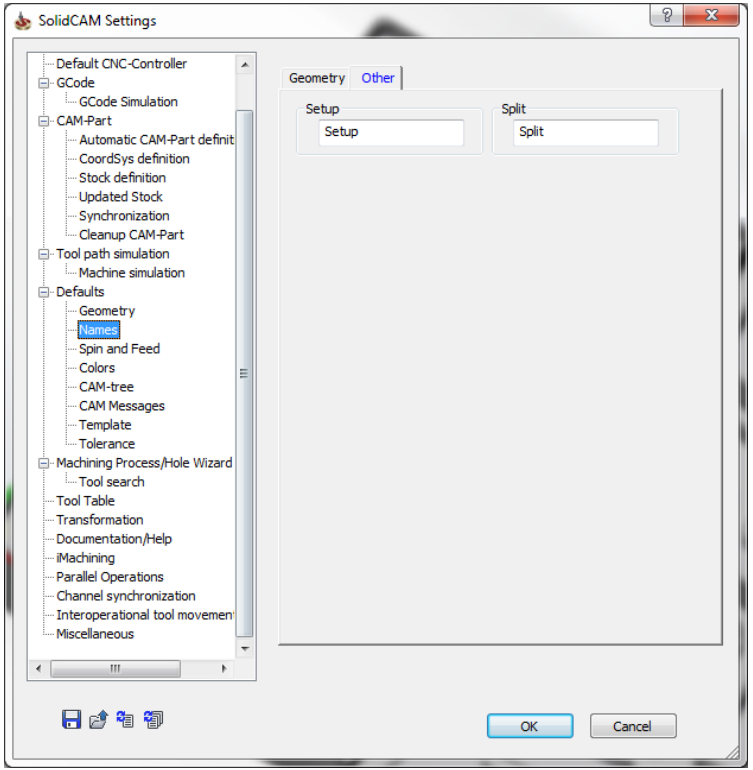
- **Import with positioning is now an option when importing your tool (used to be CAM setting)**
- **A Positioning Manager dialog is shown to manage any conflicts with tools in your current part**

Machining Process: Save As



New option to do a Save As directly from Machining Process Manager.

CAM Settings: Default name for Setup



New option to define a default name for the Setup.