# What's new in InventorCAM 2015
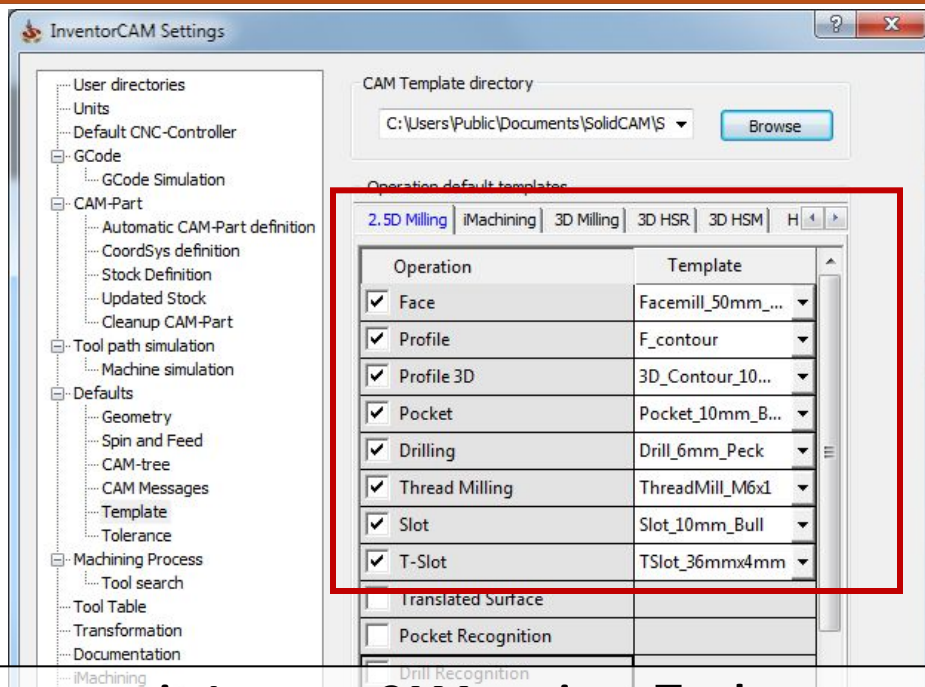
iMachining 2D & 3D | 2.5D Mill | HSS | 3D HSR/HSM | Indexial Multi-Sided | Sim. 5X | Turning | Advanced Mill-Turn | Solid Probe

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General

- **Default templates are set in InventorCAM settings □ when new operation is created these templates are used**

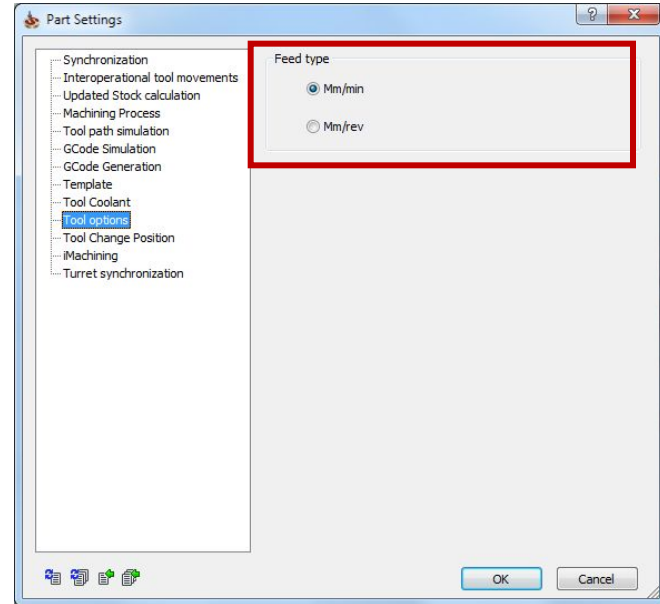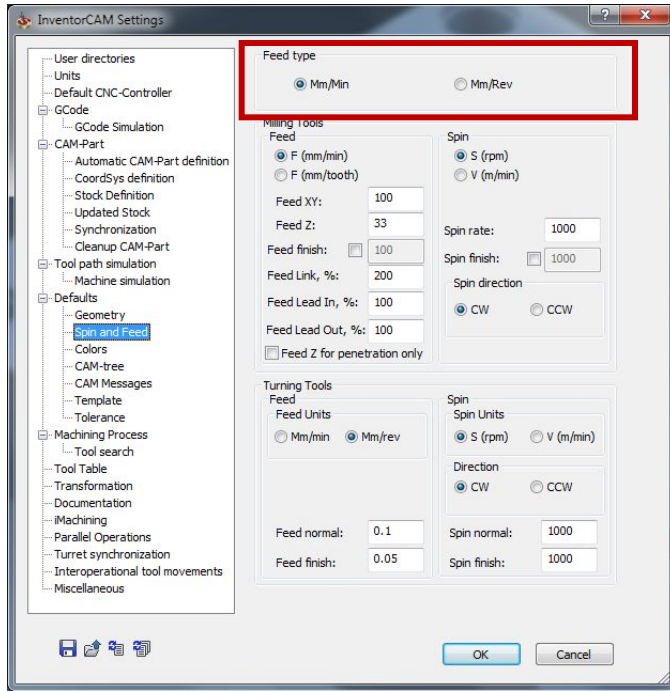- **Useful for example to have a default starting Tool**

- **Options in SolidCAM settings to skip the first New CAM-part dialog with default values**

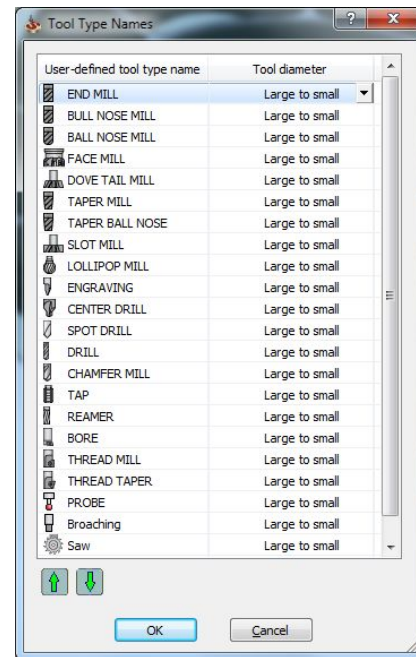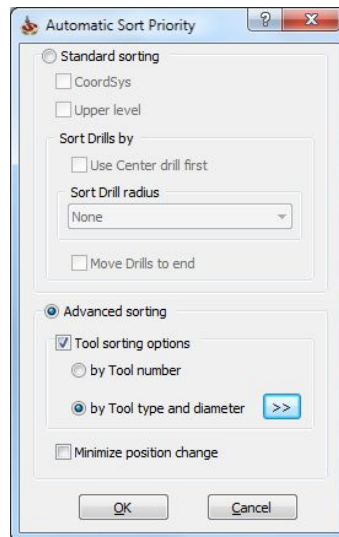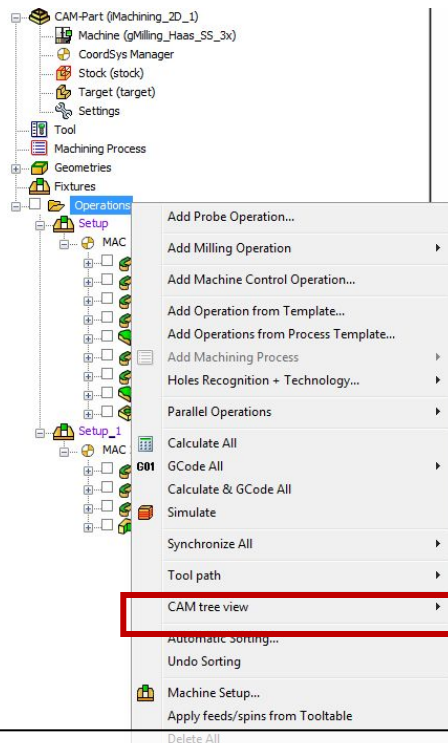- **Enables the user to start directly adding operations in a new Part**
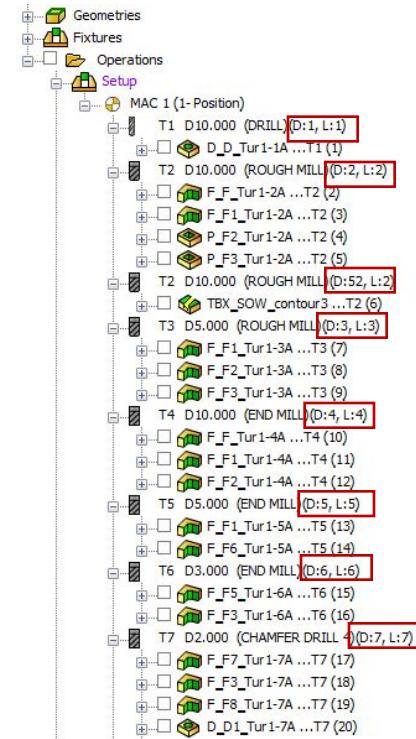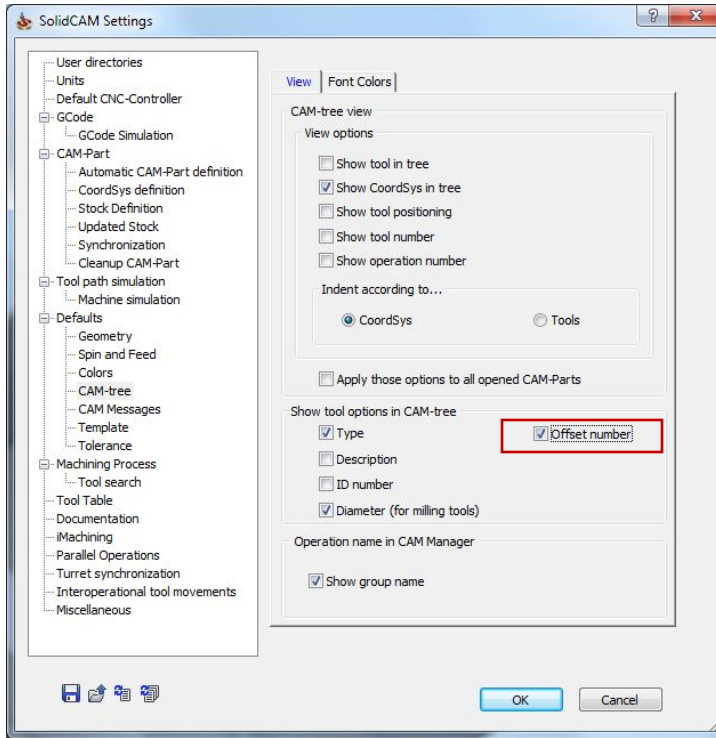
• **Define default feed type for new CAM-parts in InventorCAM settings**

# CAM tree: Advanced sorting of operations
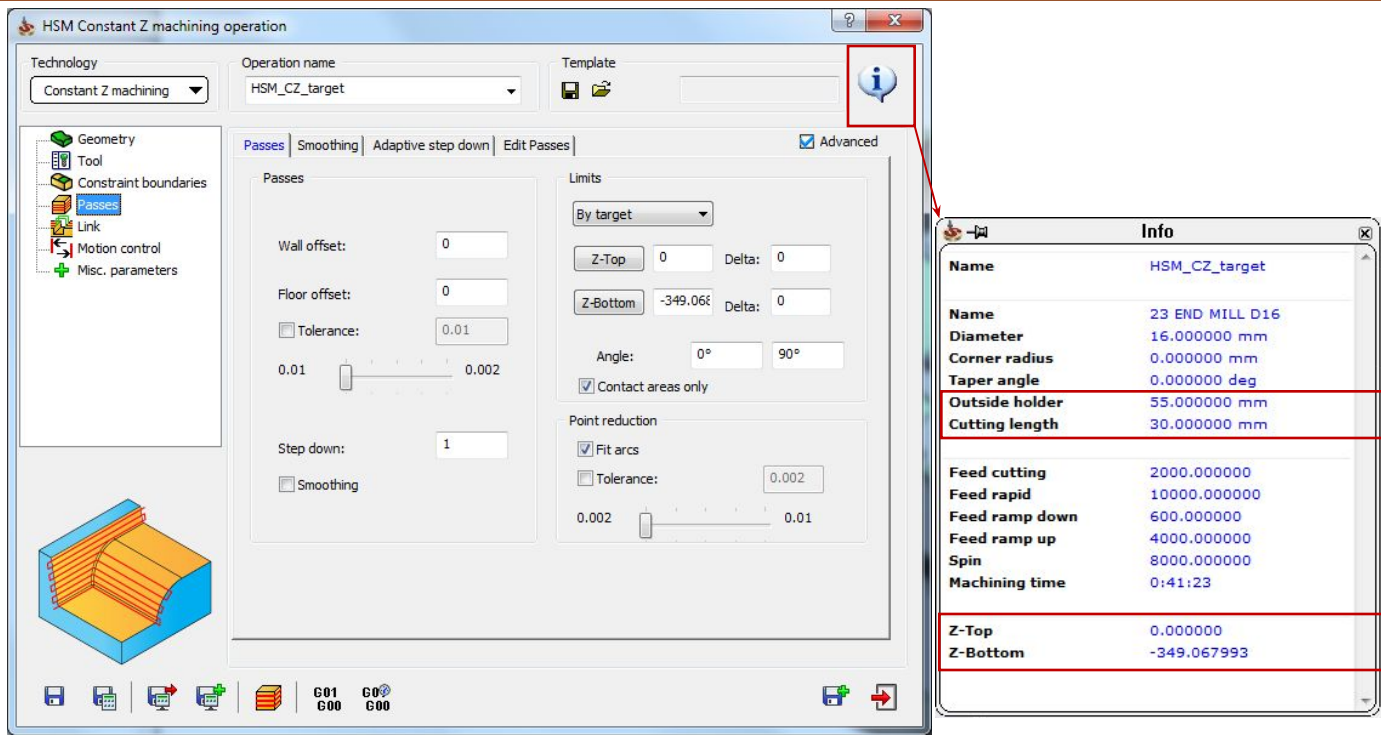


• **Possibility to sort operations in CAM-tree by tool number and tool properties (Diameter, Tool Type)**
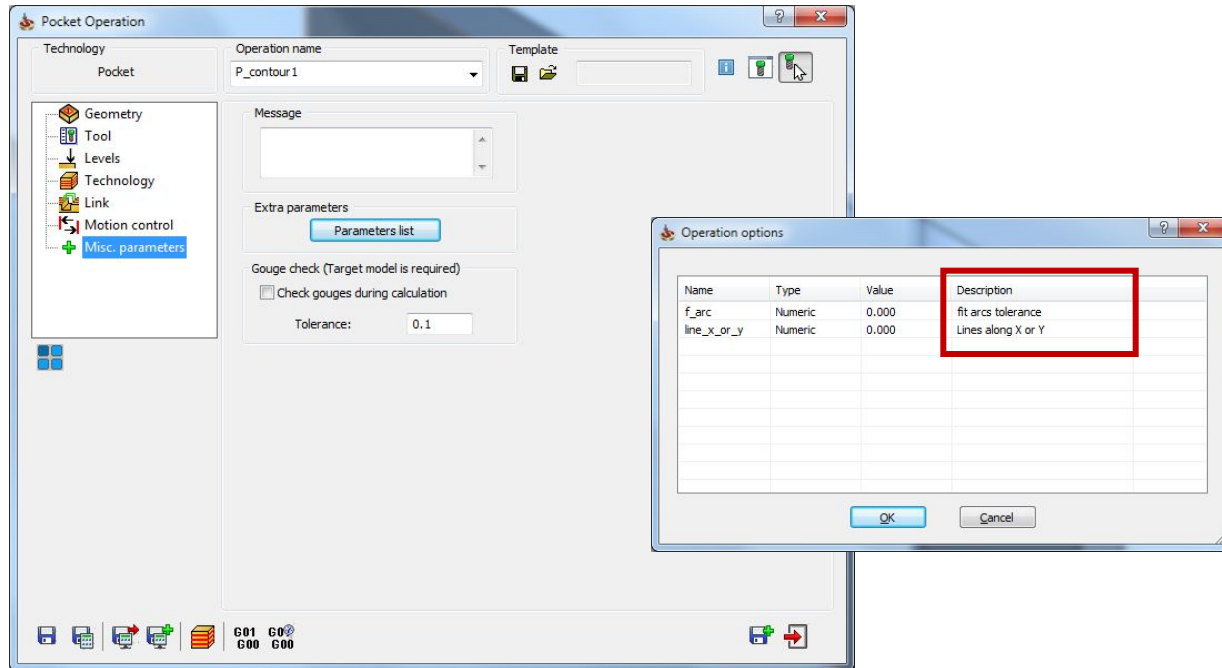
# CAM-tree: Show Tool Offset numbers



- **Show Tool Offset numbers in CAM-tree**

• **Show Cutting depth information and Additional tool data in Info dialog**

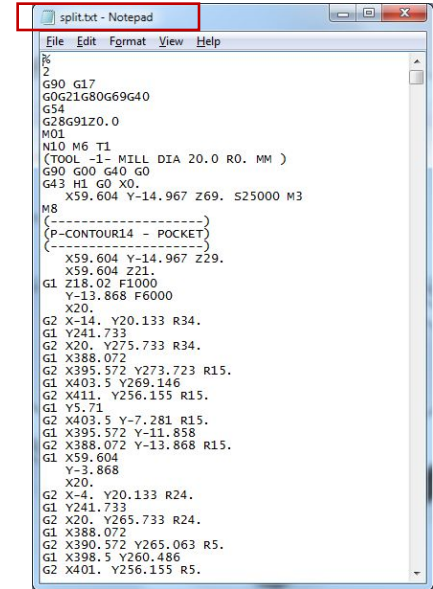• **Description of user-defined parameters is now visible inside the operation**

# Generate G-code per operation
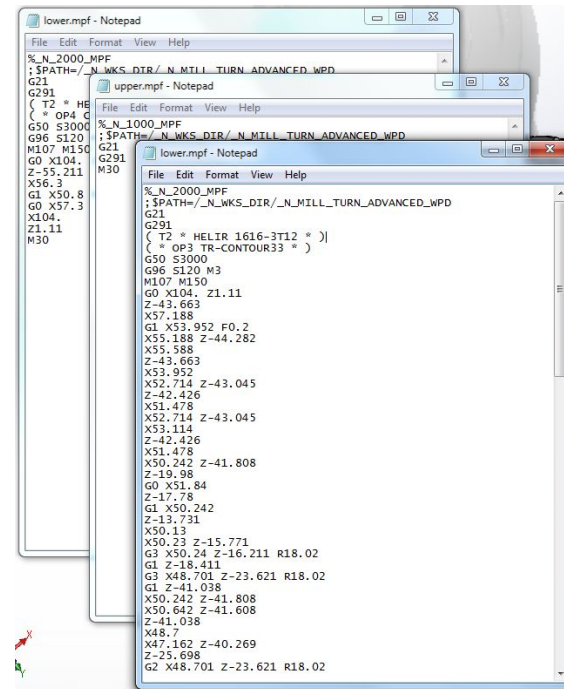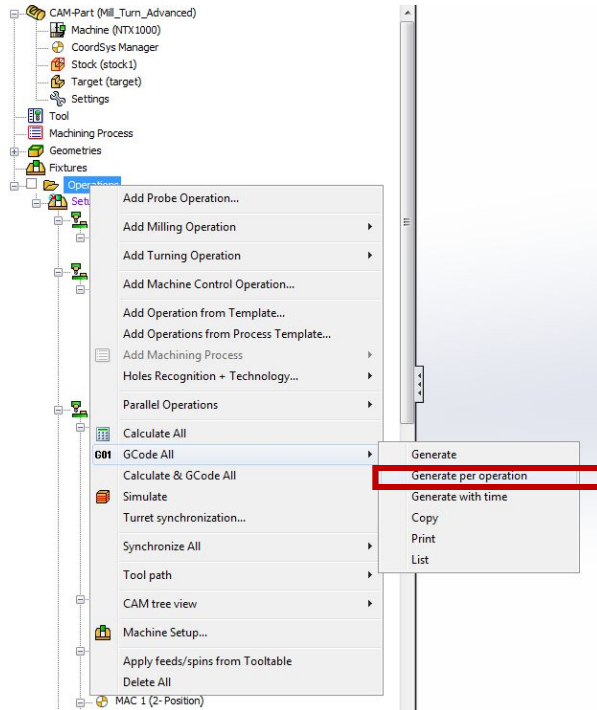


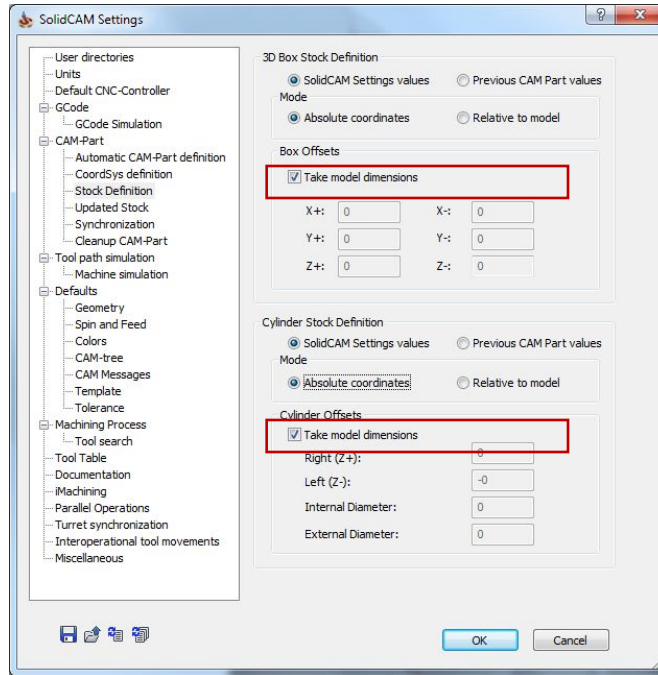• **Generate separate file of G-code per each operation**
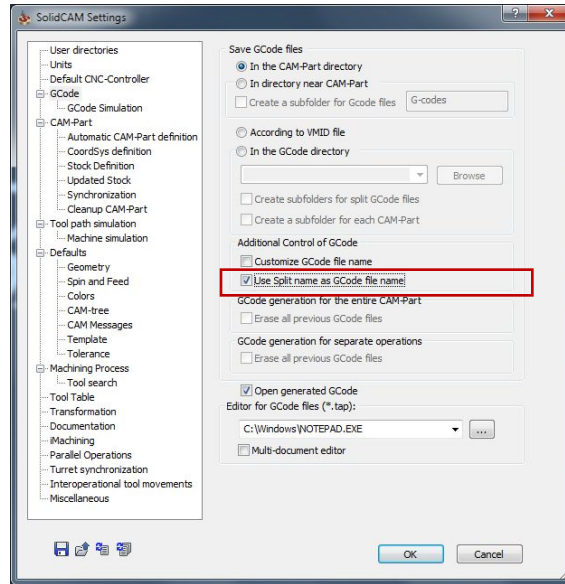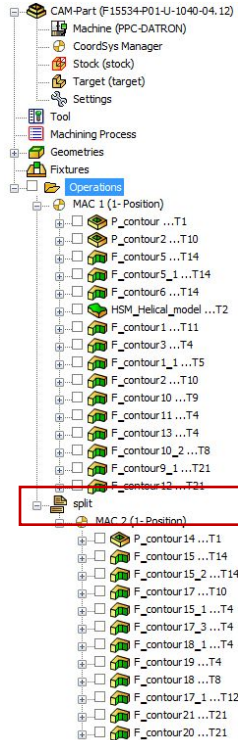
• **Use name of Split as name of G-code file**

- **When Stock definition mode is set to Absolute Coordinates – dimensions of Target model will be taken automatically**

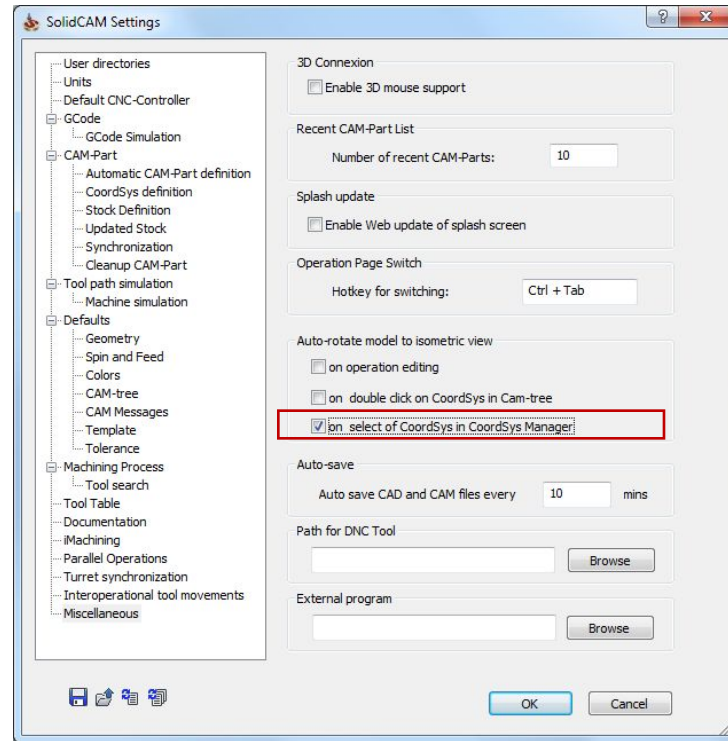• " High precision" for box (facetting) set to ON always during CoordSys definition
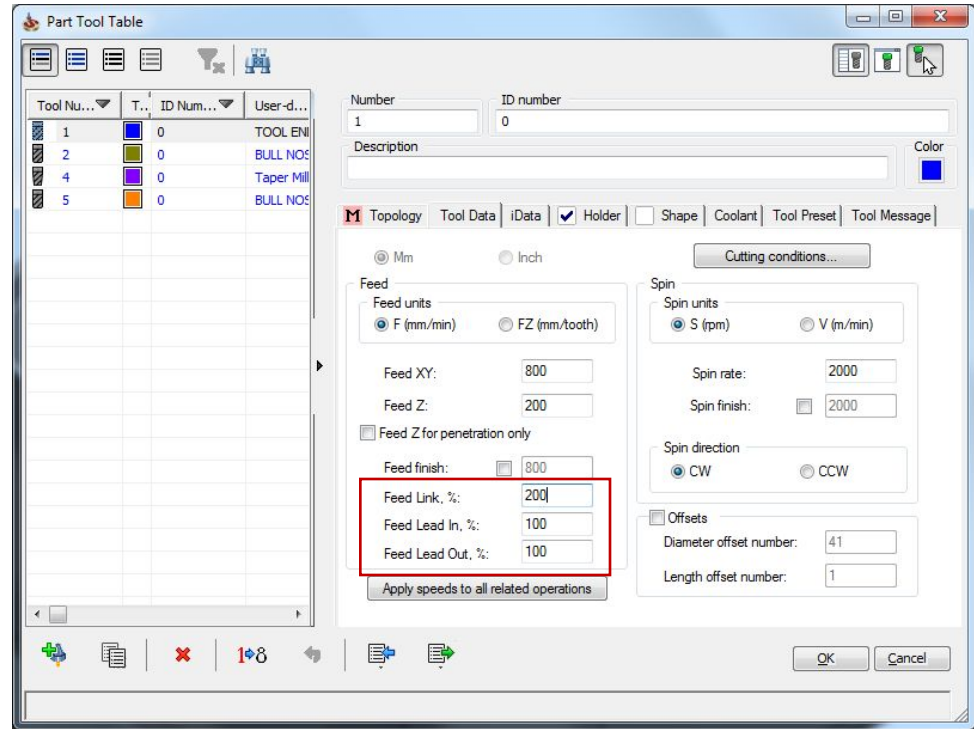
• **Rotate model to isometric view when clicking on CoordSys in CoordSys manager**

• **Possibility to define defaults through Settings for Feed Link, Lead In and Lead Out**
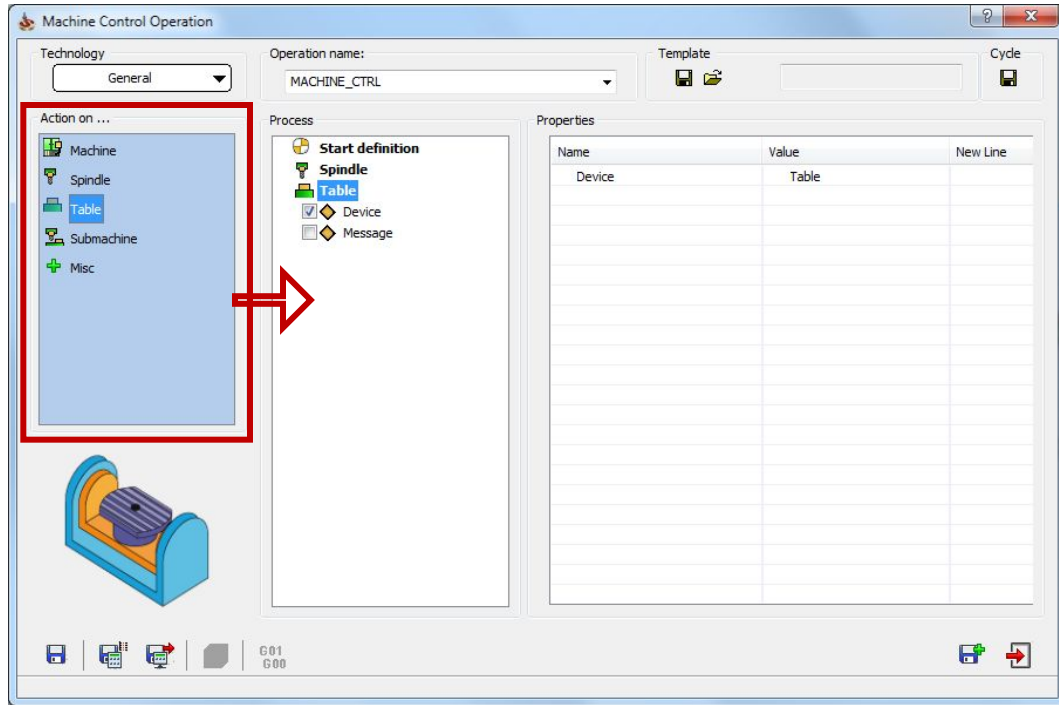
• **Double click on the item in the „Action on..." list automatically adds this item to the Process list.**
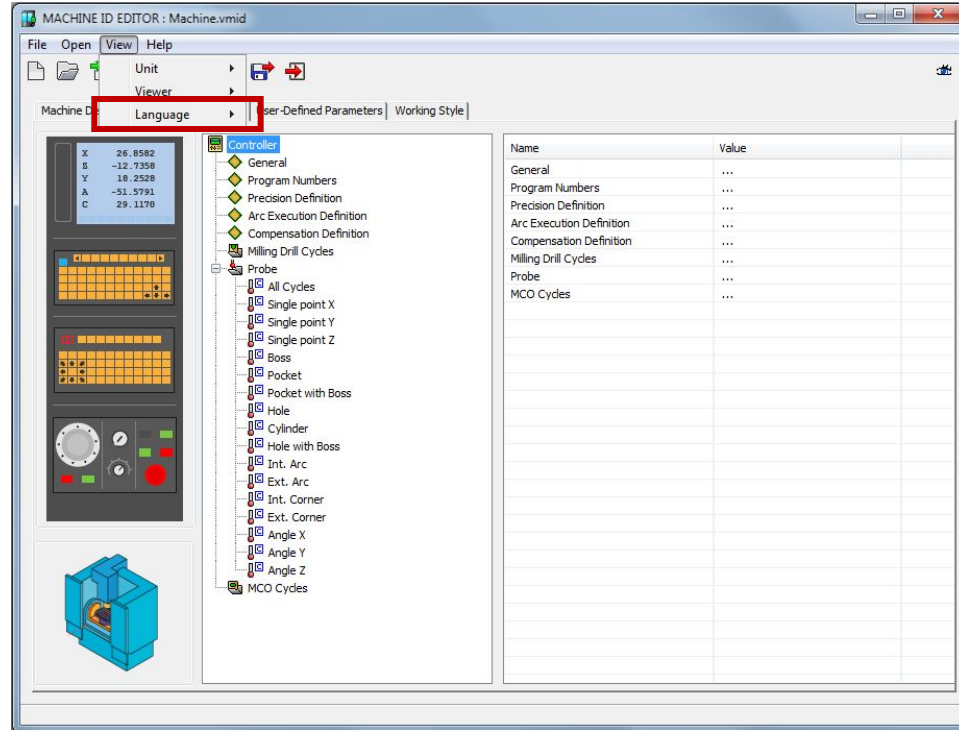
- **Possibility to show MachineID editor fields in any language, independent from main installation language**

# CoordSys

# CoordSys: Always build box around target model
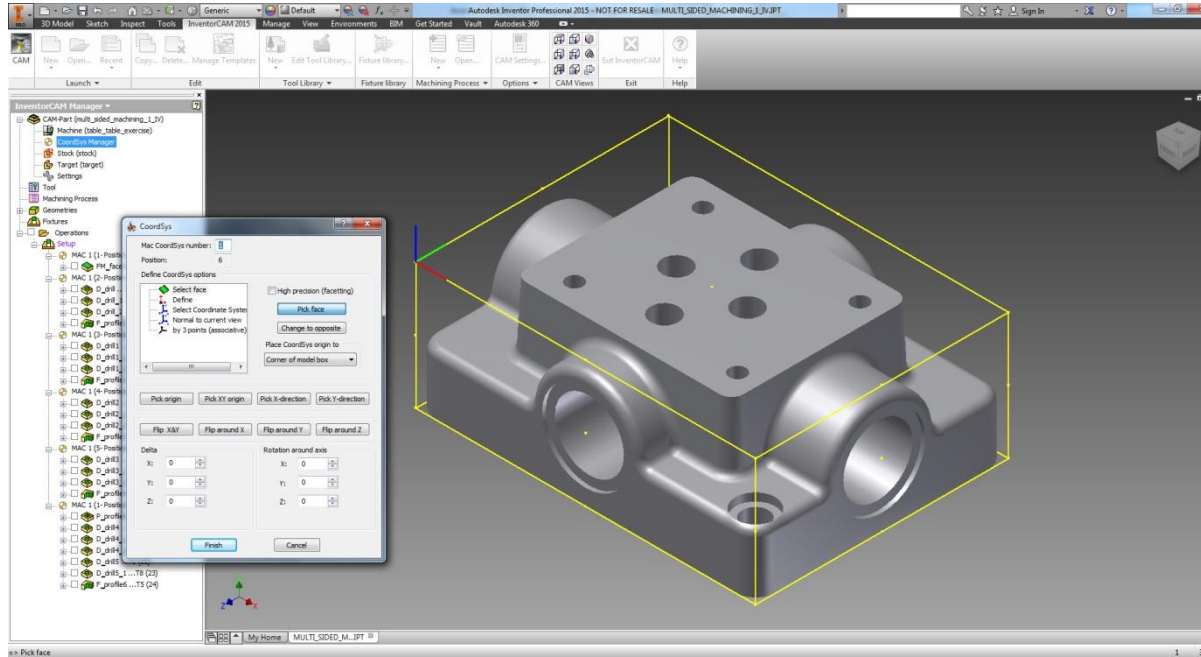


- **Create by default CoordSys envelope box around the target**
- **Useful for CoordSys Origin definition**

- **Radial movement levels are now on the main dialogue (instead of TAB)**
- **Better noticed by user**
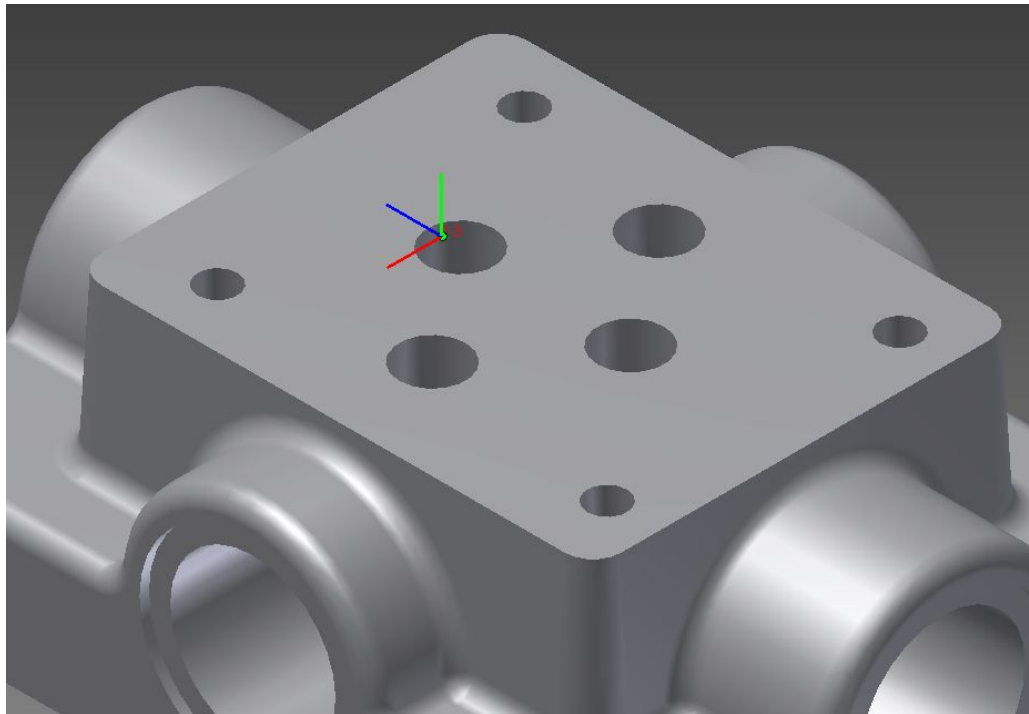
• **Support of associativity of a CAM CoordSys, that is built on a Inventor CoordSys**
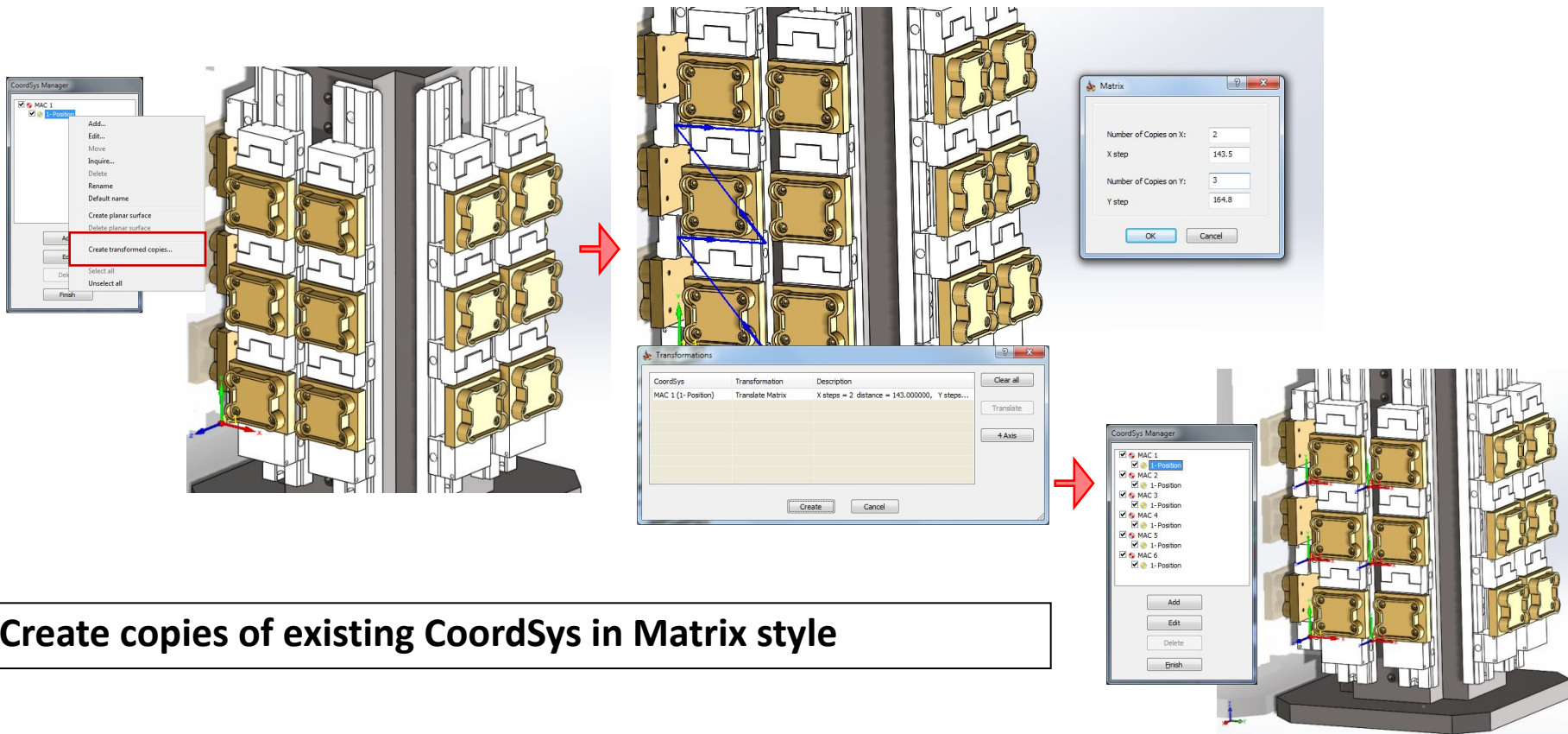
• **Create copies of existing CoordSys in Matrix style**

- **Create copies of existing CoordSys around user-defined axis**
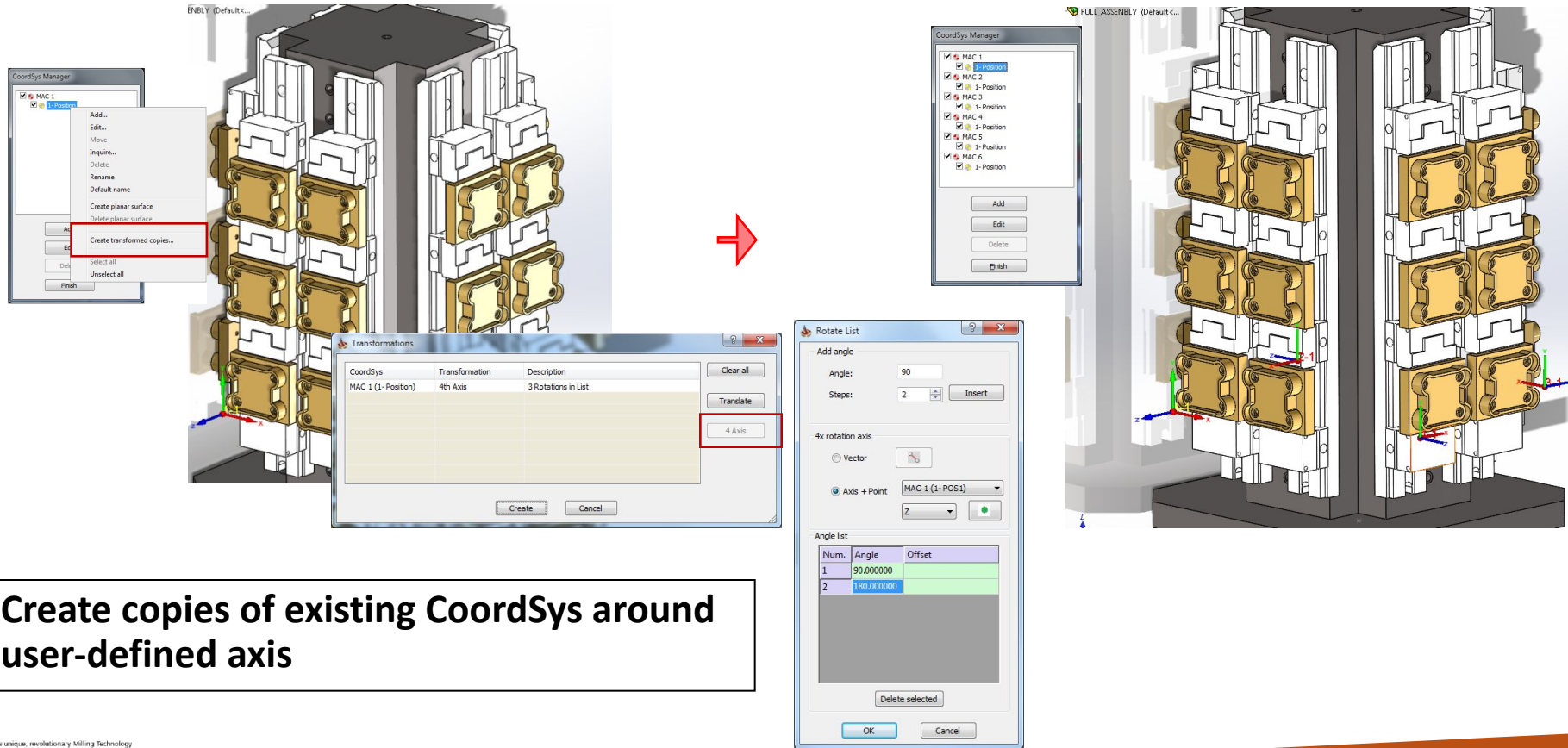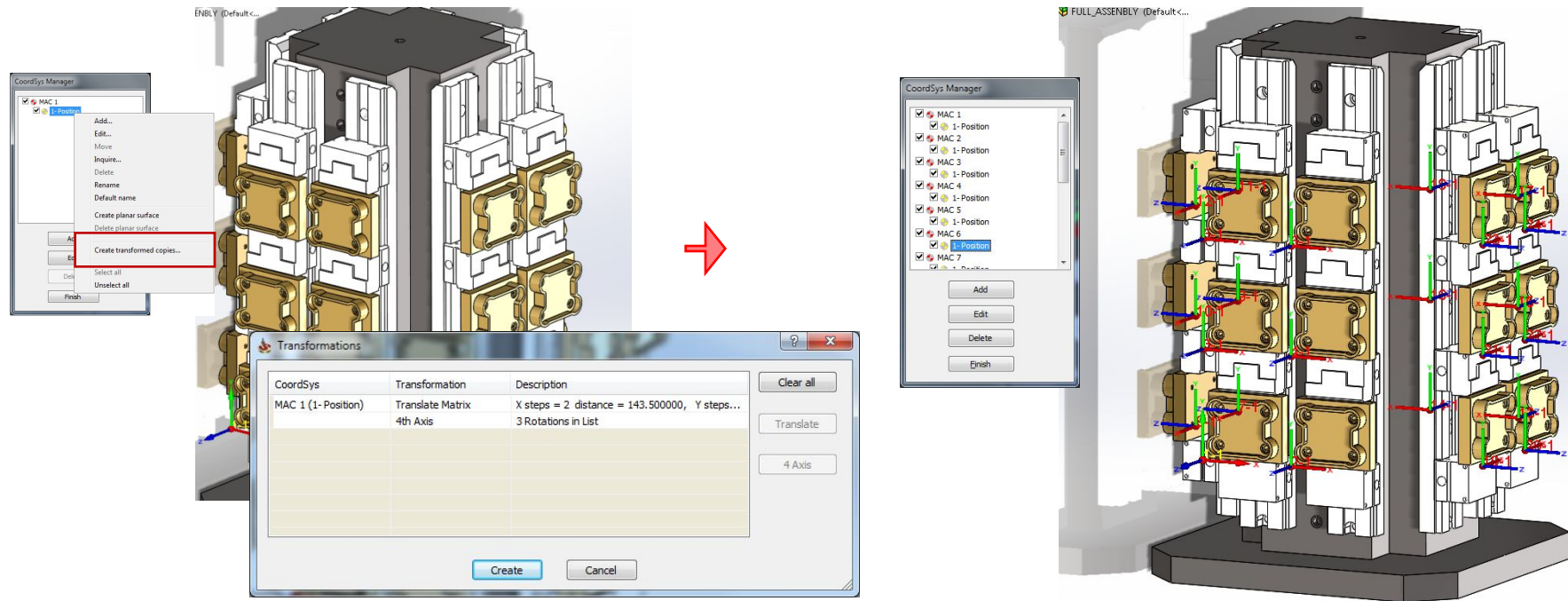
- **Combine 2 styles of CoordSys copying**

- **User can use each style of transformation only once**
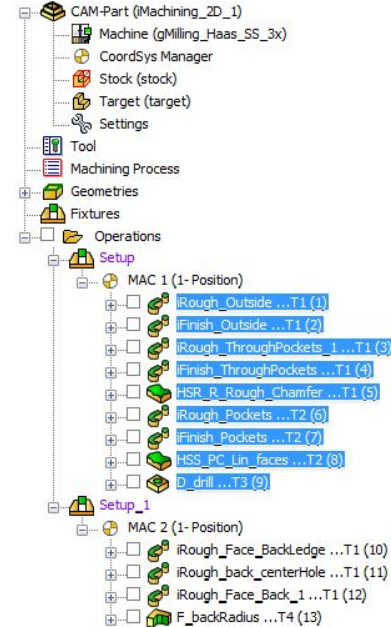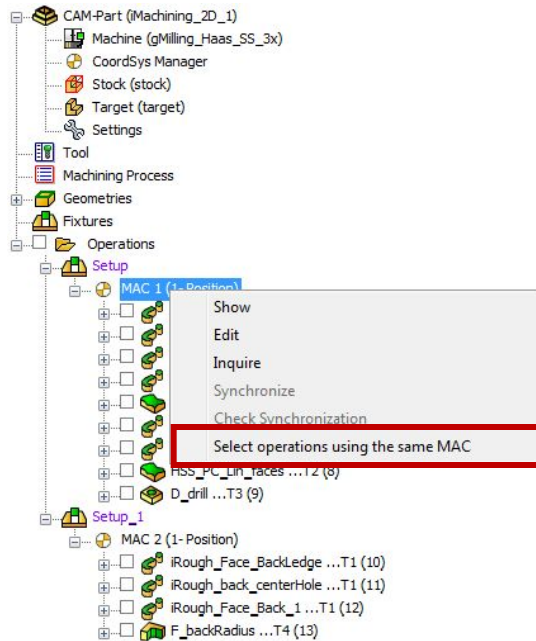
• **Fast selection of all operations defined in the Coordsys (MAC ) and it's positions**

# Transformation

• **Possibility to make Matrix witout original operation toolpath**

• **Useful for postponed transformed operations**
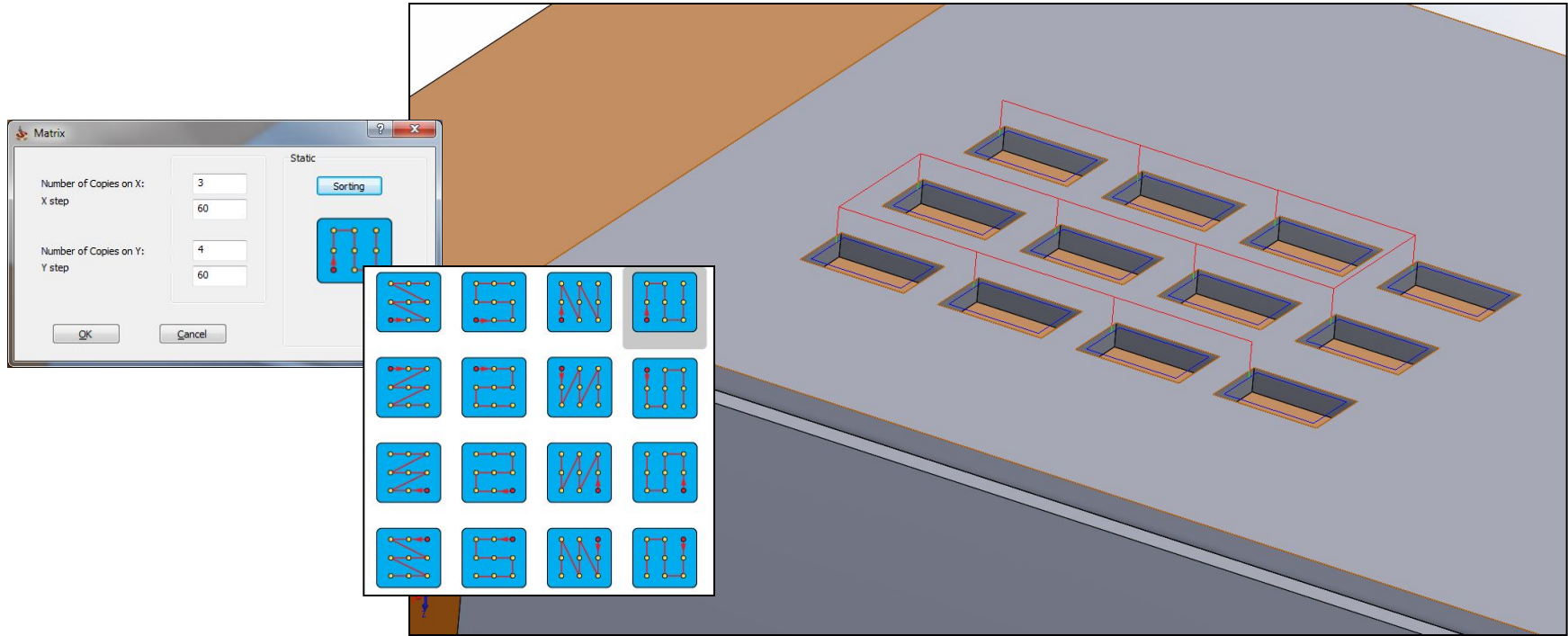
- **Additional Sorting options in Matrix transformation**

- **If Optimization of operation loops is turned on in \*.VMID, the sorting types which will be affected by optimization, are marked by green color**

- **If "optimize Matrix sorting" is checked – movements between 4th axis positions are done to minimize tool movements**
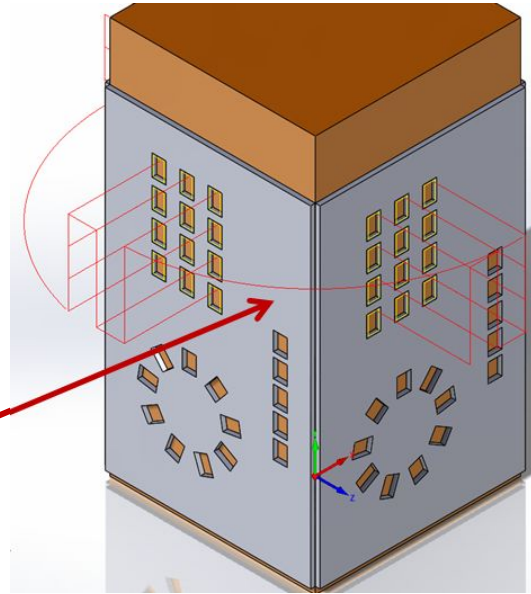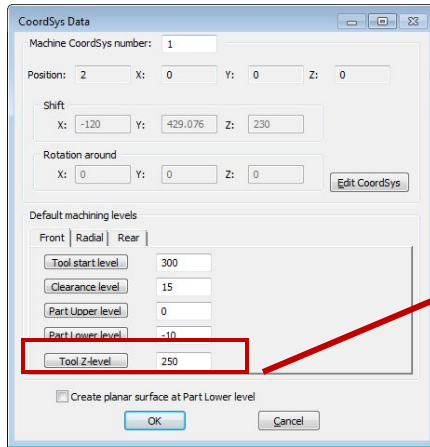
- **Use Tool Z level from MACx-posN for movements between planes in Transformation around 4x**
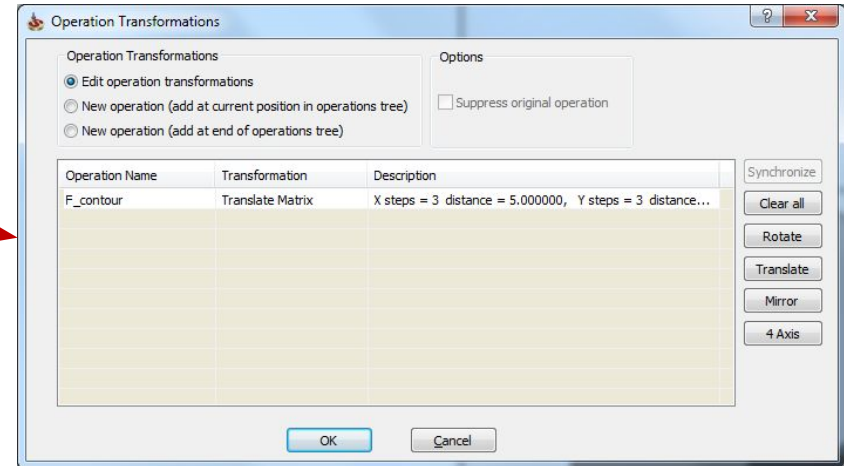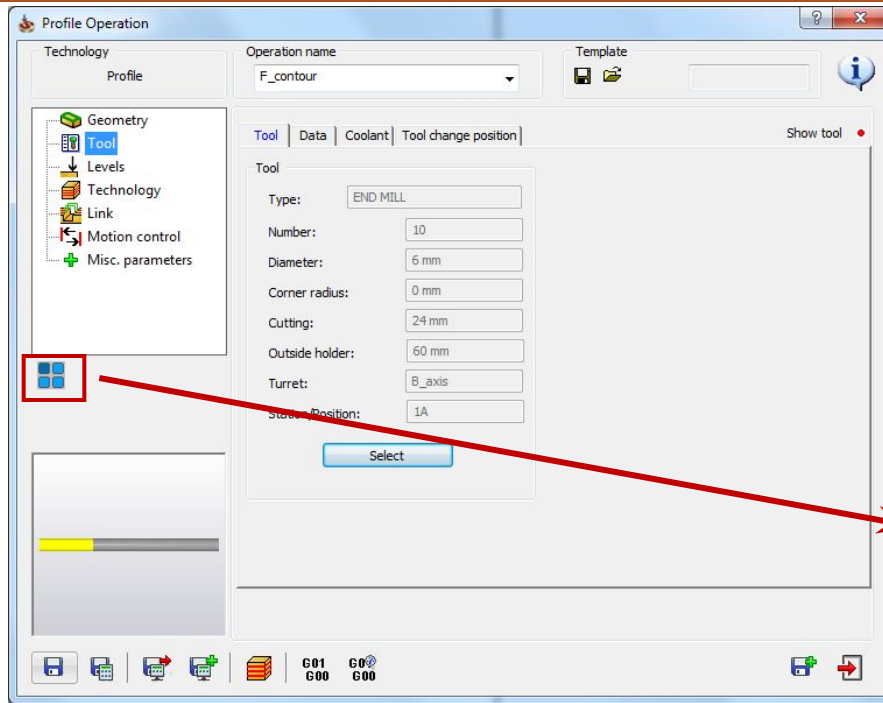
**• Possibility to open Transform dialog straight from the Operation dialog**
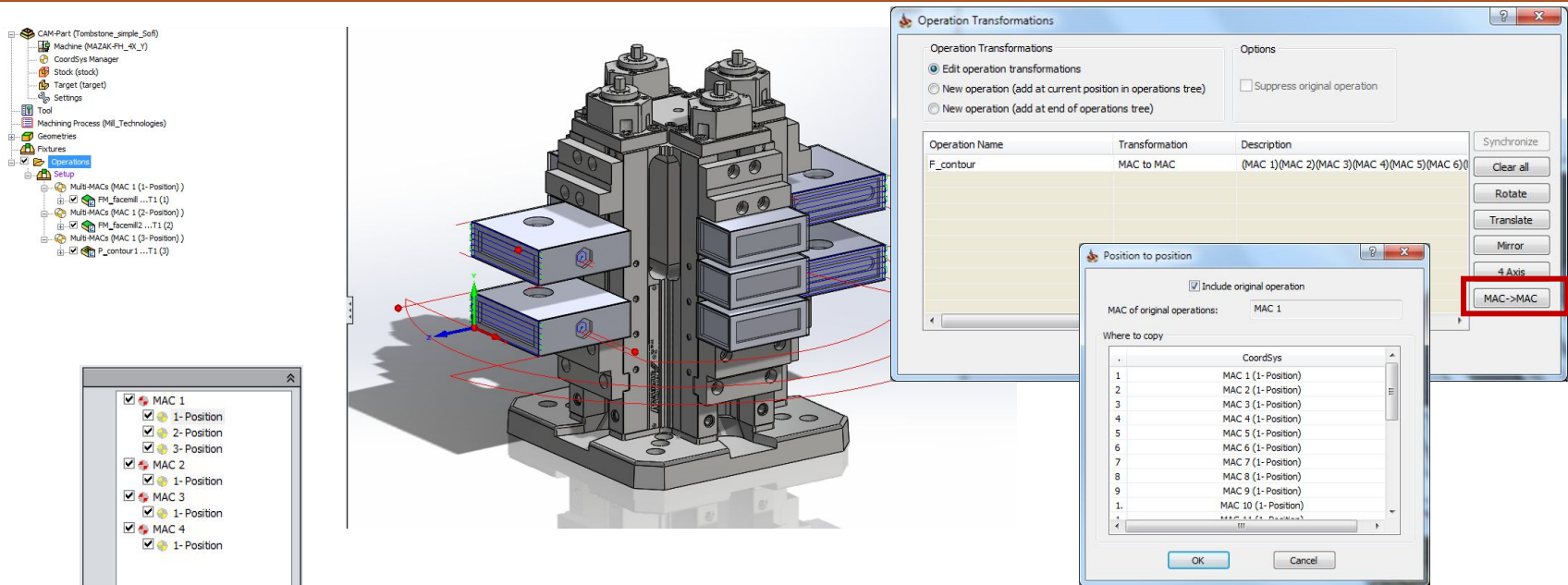
- **Coordsys where operations should be copied to , should contain only 1 position (other positions will be created automatically )**
- **Useful for Tombstone operations as it enables the simple transfer of an operation to any Coordinate system, created on any face of the Tombstone.**

# Tooltable
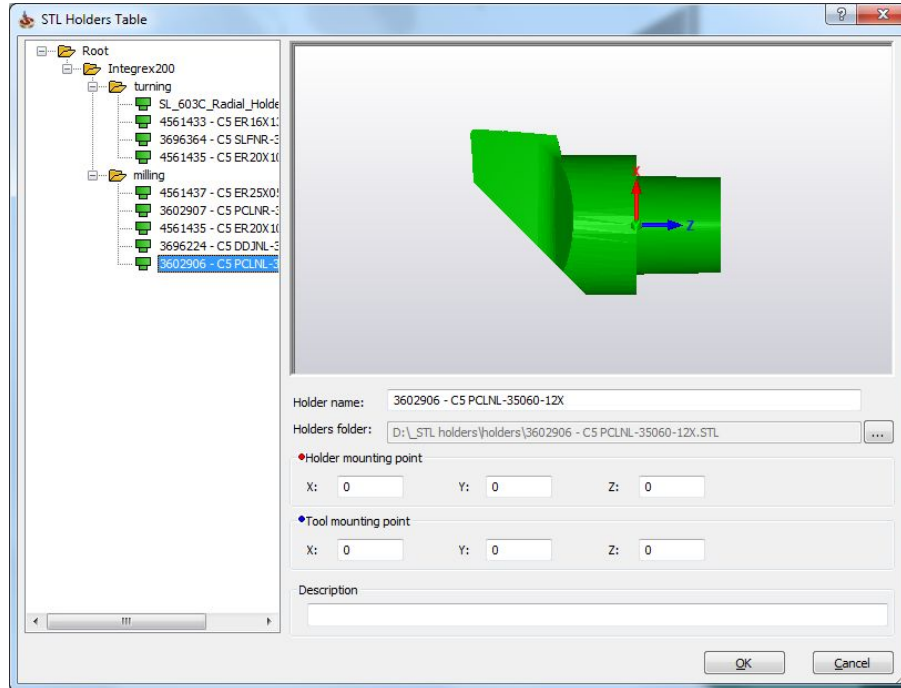
• **Combine Milling and Turning STL Holders under one machine library**
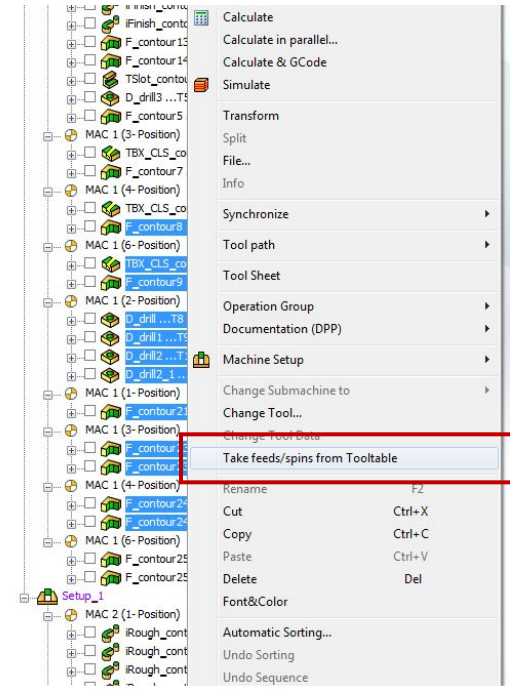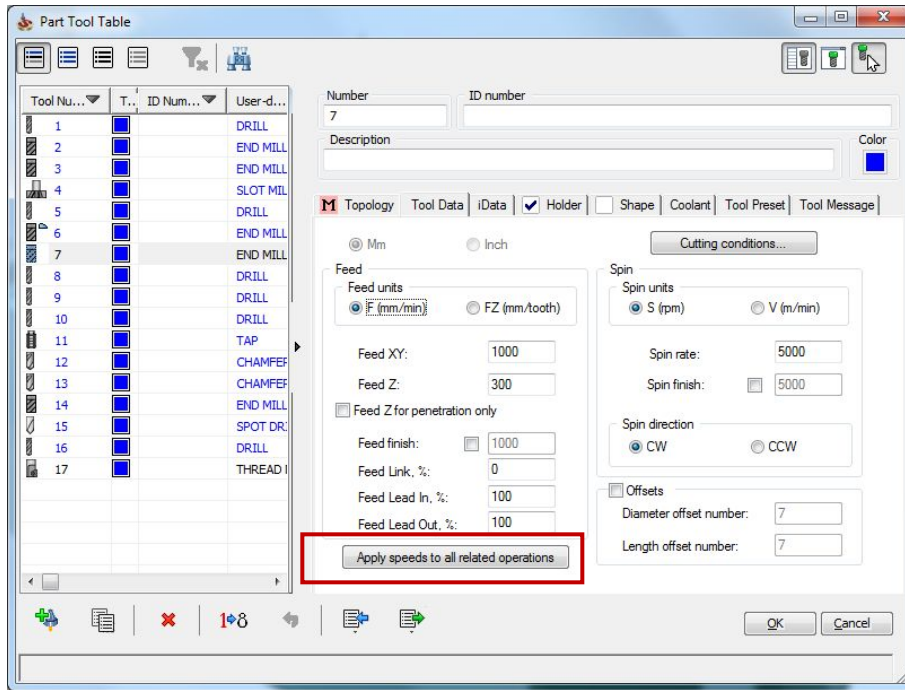
- **Possibilitiy to update feeds and spins in operations according to changes in tooltable**
- **Available from tooltable and from CAM-tree**

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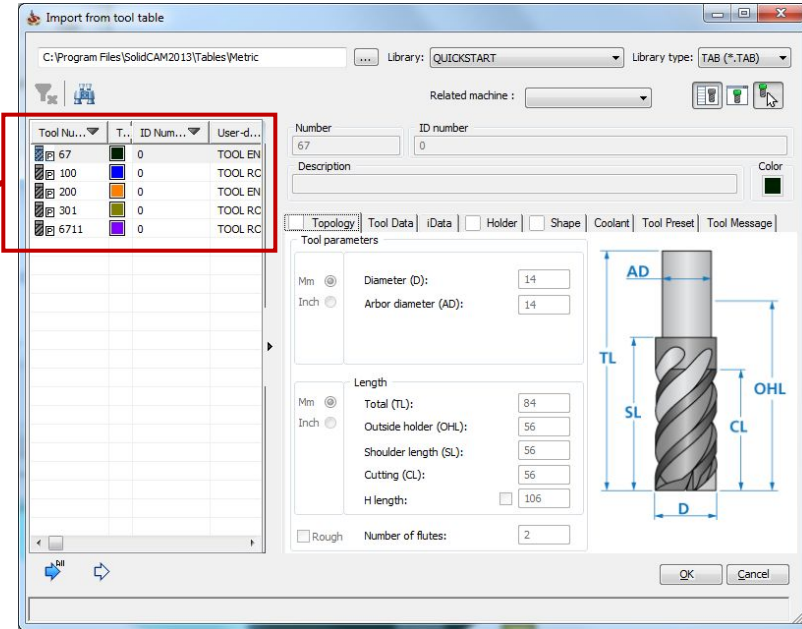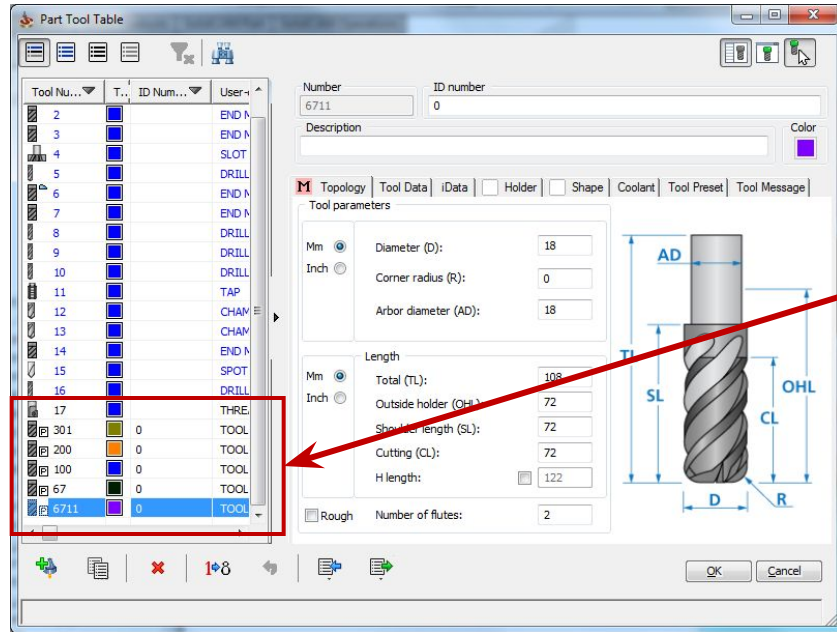
• **If tool is marked as permanent – it will be imported without any change in any field**
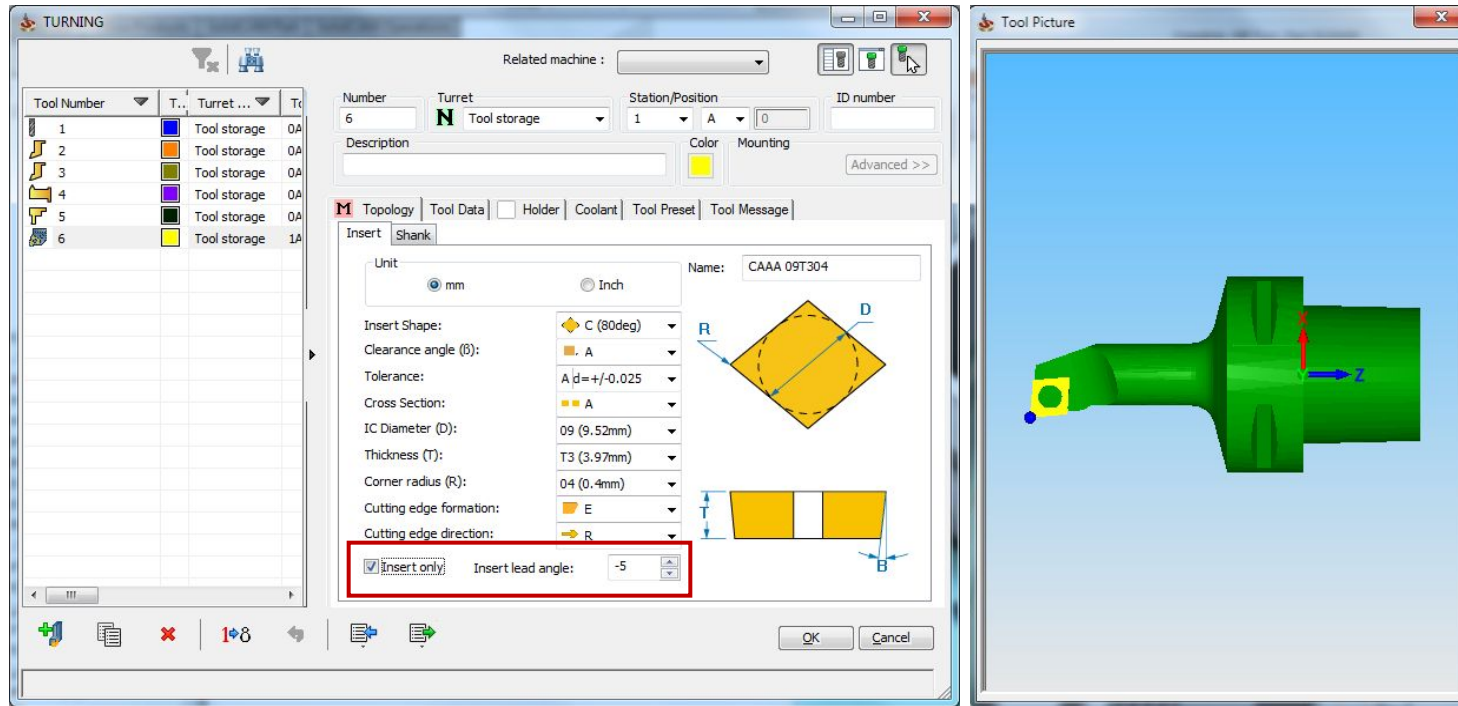
• **Option to rotate insert, when working in Insert only mode, by setting Insert Lead angle**

# Geometry

• **Select only faces of specified color in Pocket Recognition geometry**

• **Creating chain geometries has been made a lot easier - this option enables you to use a combination of Tangent and Delta Z to create Multi level Chains.**
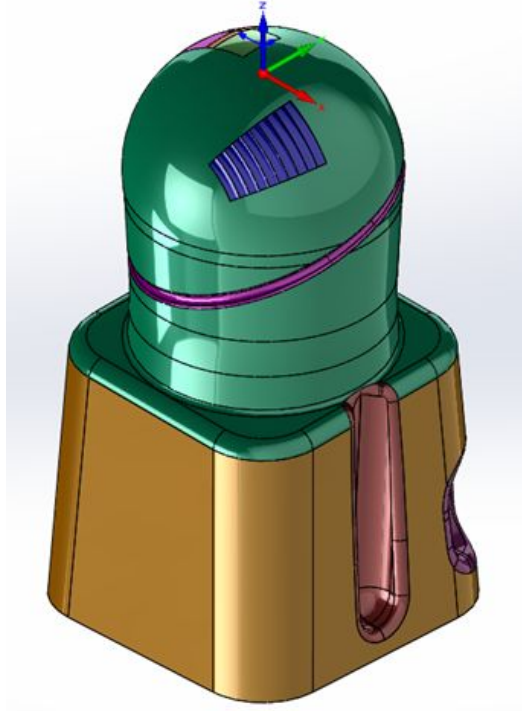
• **Select only faces of specified color in HSS and 5x geometries**

- **Option to add offset to geometry of Pocket operation**
- **Enable user to handle tolerances, without defining new geometry**

- **Option to add offset to geometry of Slot operation**
- **Enable user to handle tolerances, without defining new geometry**

# Drill geometry: Modify option
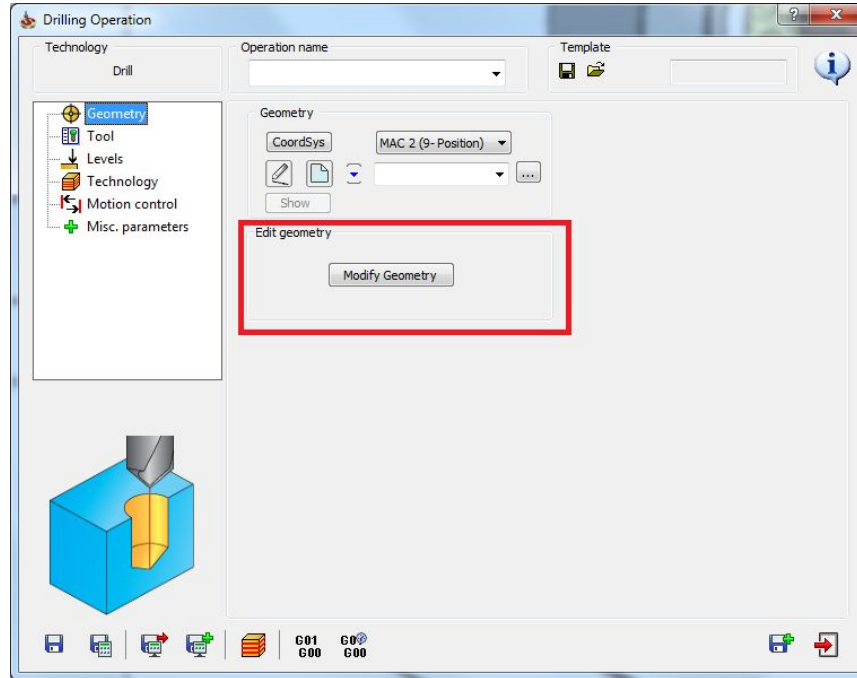


- **X and Y shiftings available per hole for Drilling geometry**

• **User Interface changes in Wrapped geometry definition**
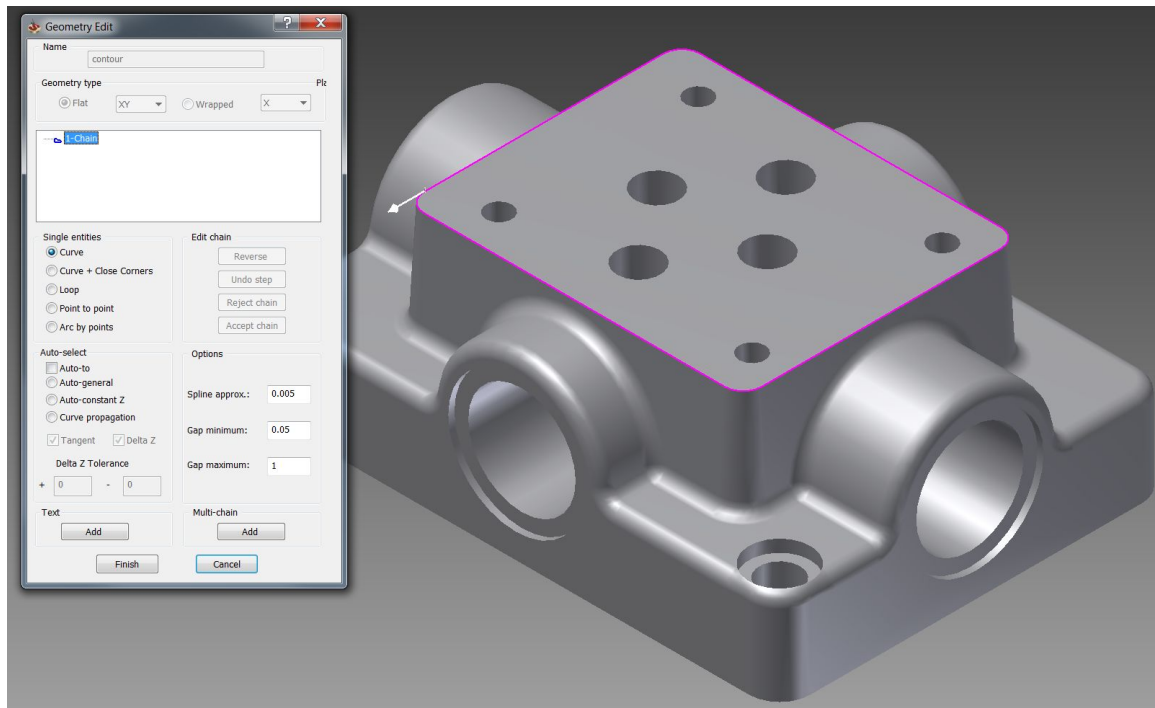
• **Easy way to reverse geometry – press F5 button on keyboard**

# 2.5D Mill

# Face milling: Vertical ramping option
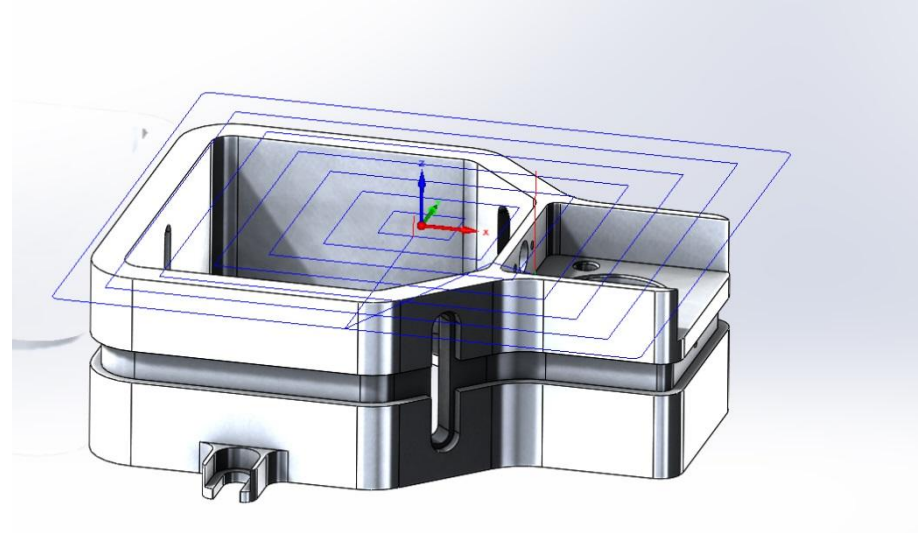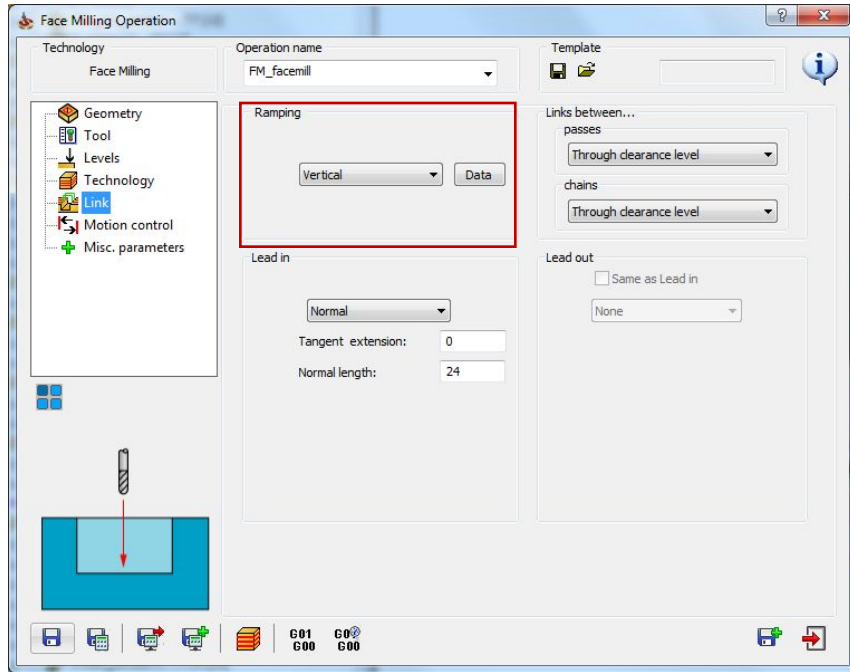


- **New option "Vertical" for Ramping options in Face milling operation**
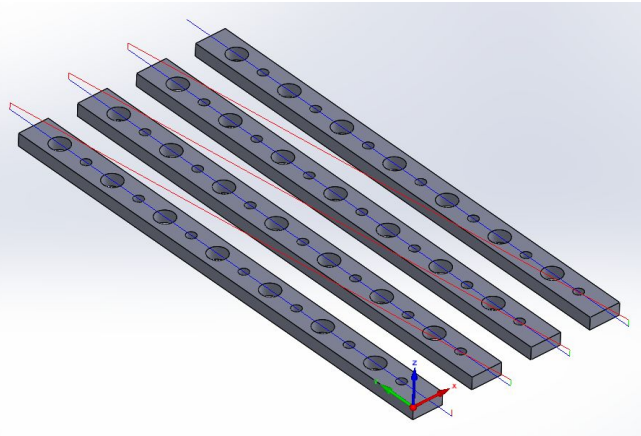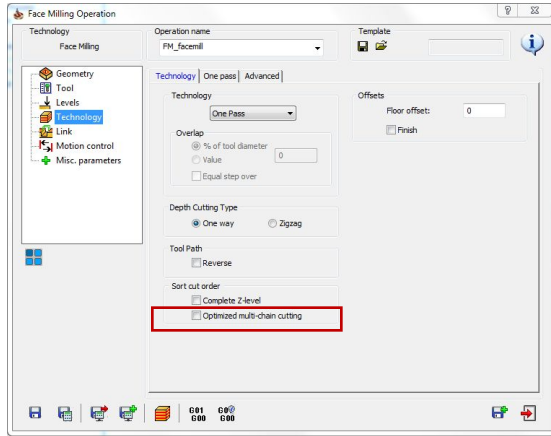
- **For long geometries that require one way face milling – there is option to skip long non-cutting tool moves**
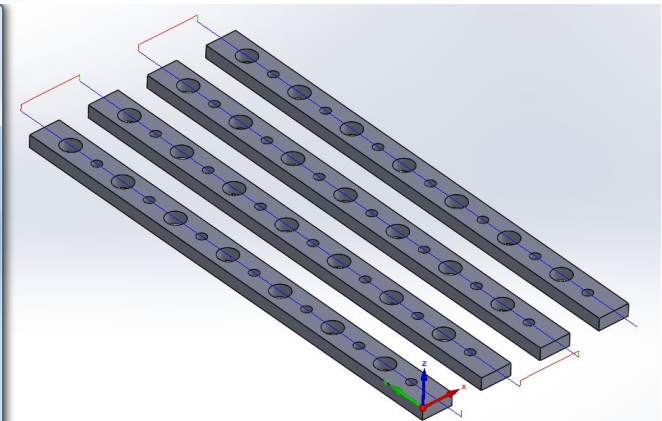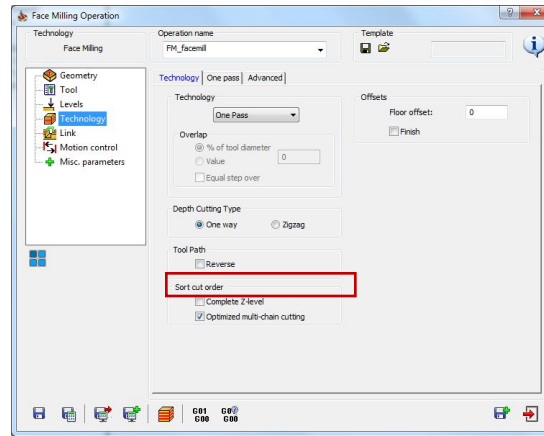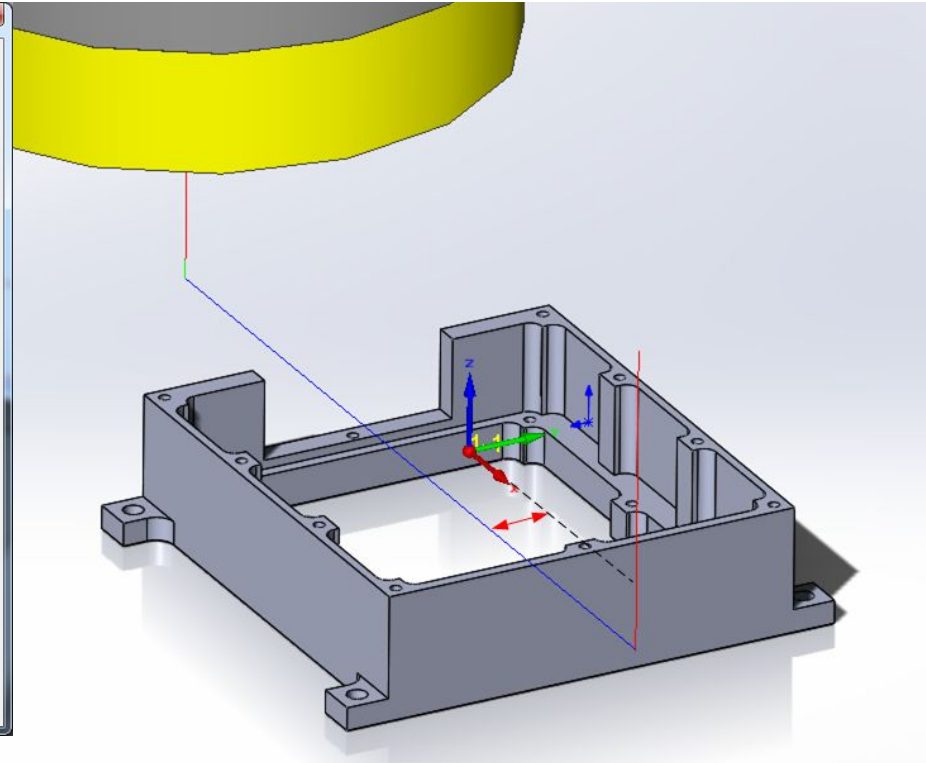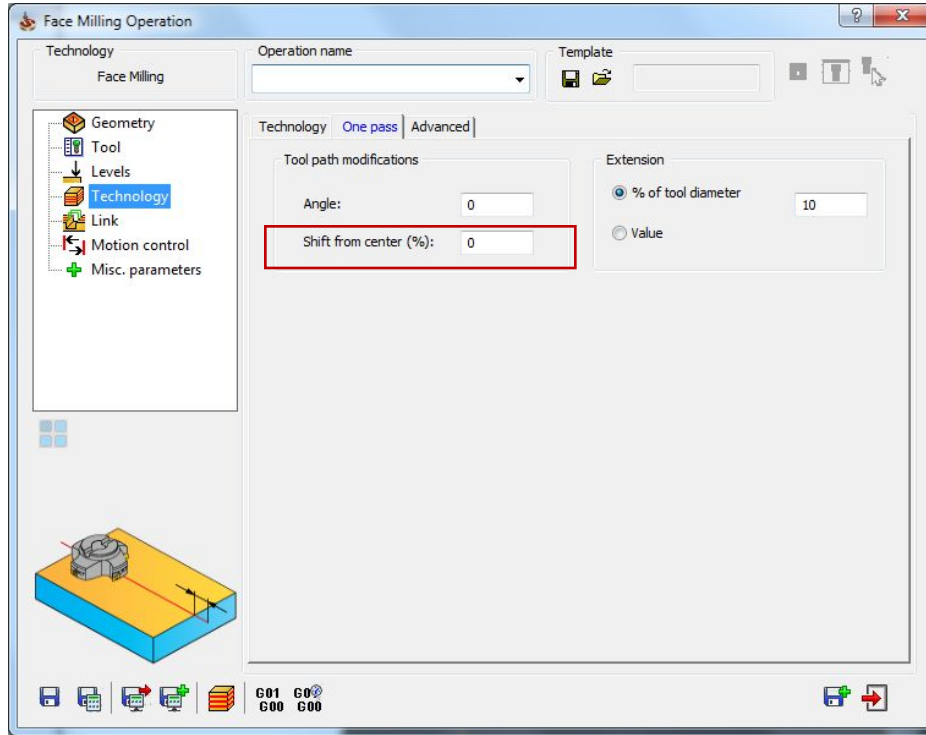
- **Shift the single cutting pass by applying % of tool diameter**
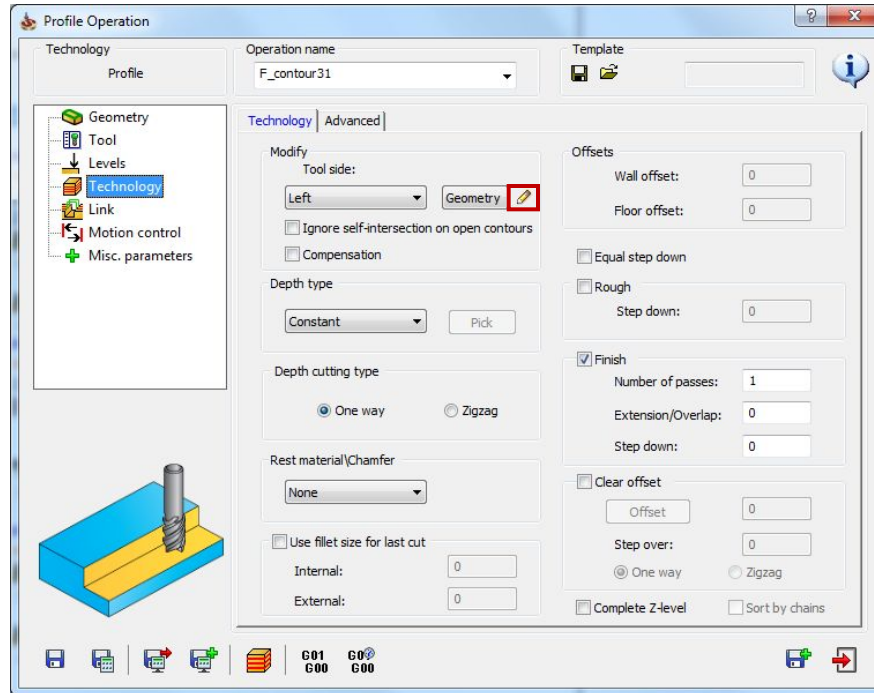
- **If in an operation, modification of geometry was applied – an icon indicating a change occured appears near Geometry button.**
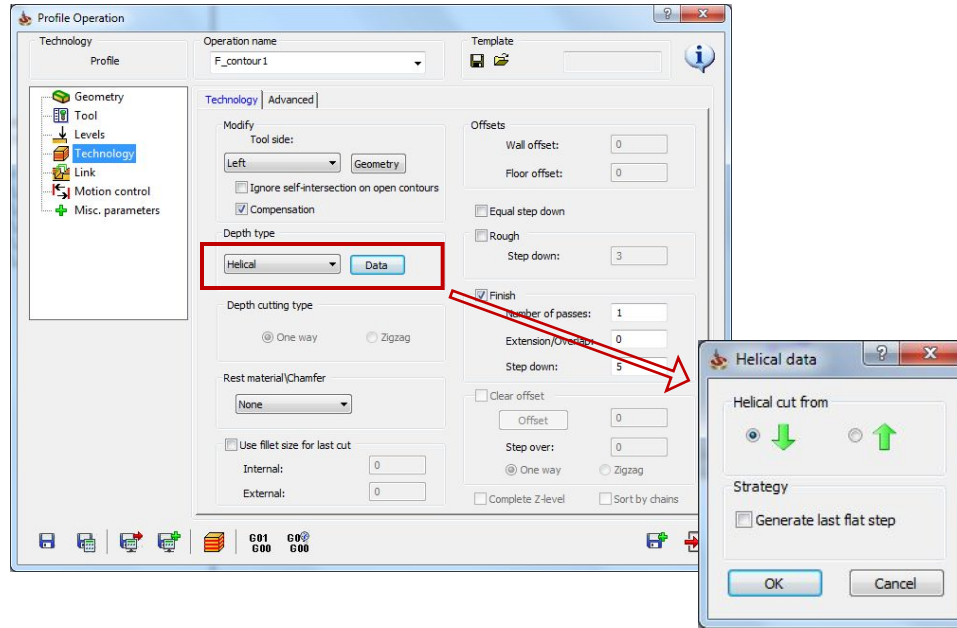
- **Different start positions: From top to bottom, From bottom to top**
- **Optional flat circular movement at the bottom of helical cut**

- **Use lead in/out on each cut of Clear offset strategy**
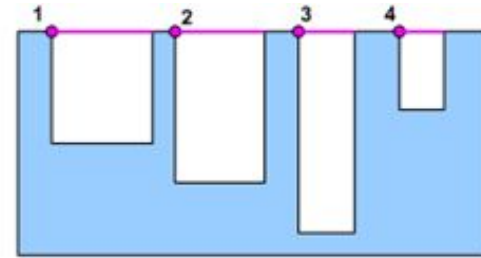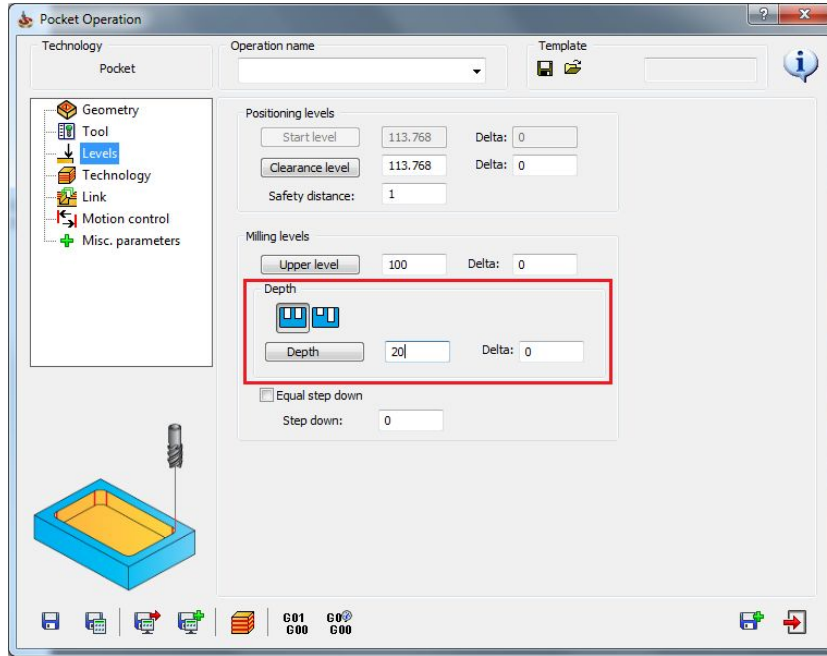
- **Define depth of pocket per chain => possibility to machine pockets with same start level but different depths, in same operation**
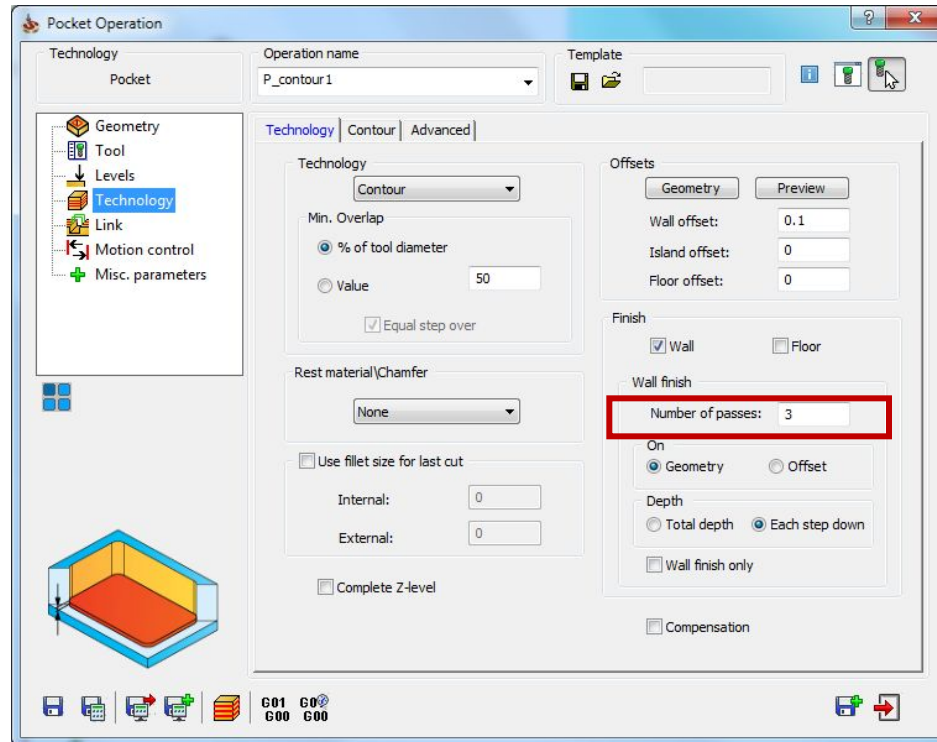
- **Several finish passes at the same place in Pocket operation**

# Toolbox
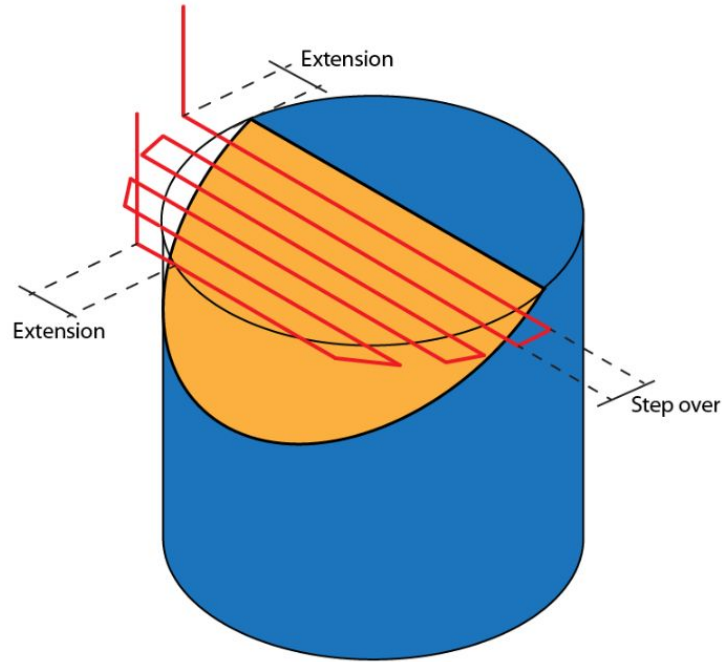
- **Machining of angled cylinder**
- **Minimizing air cuts**
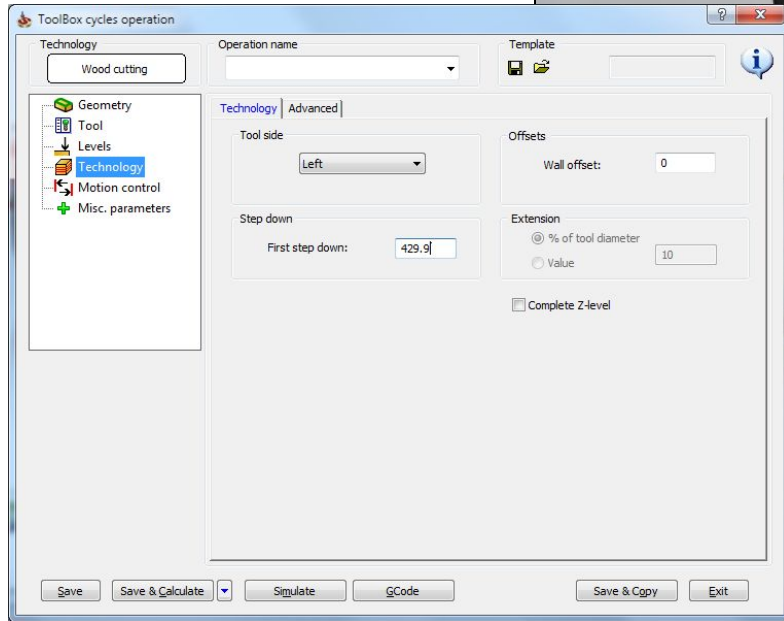
- **Special strategy for wood cutting**
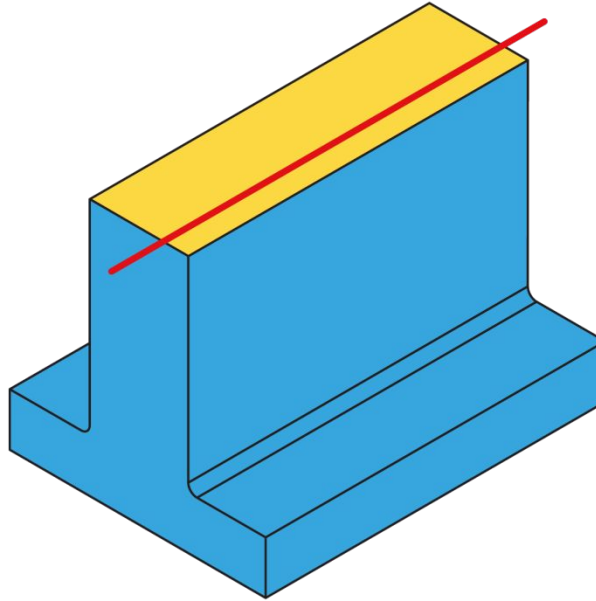
- **Cleaning of rib faces**
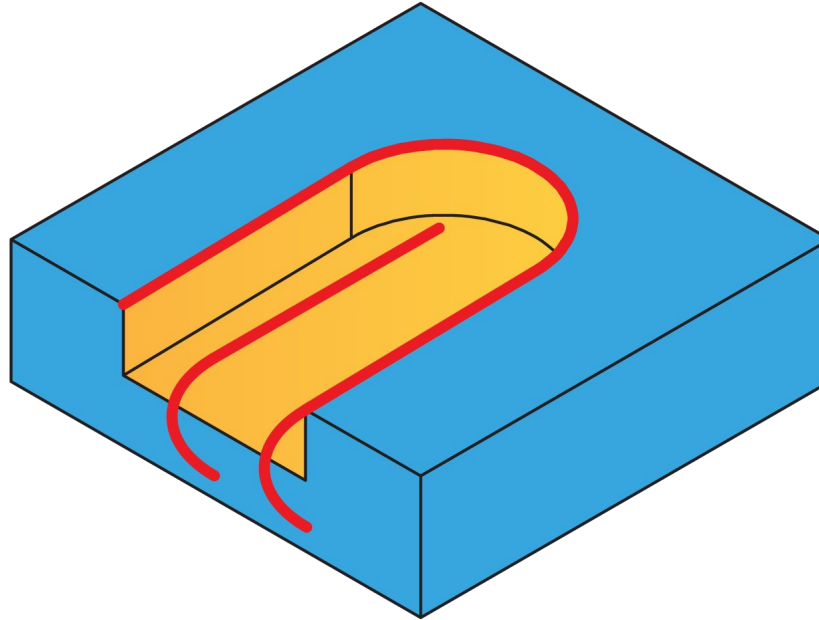
• **Constant tool loading, when entering a closed slot**
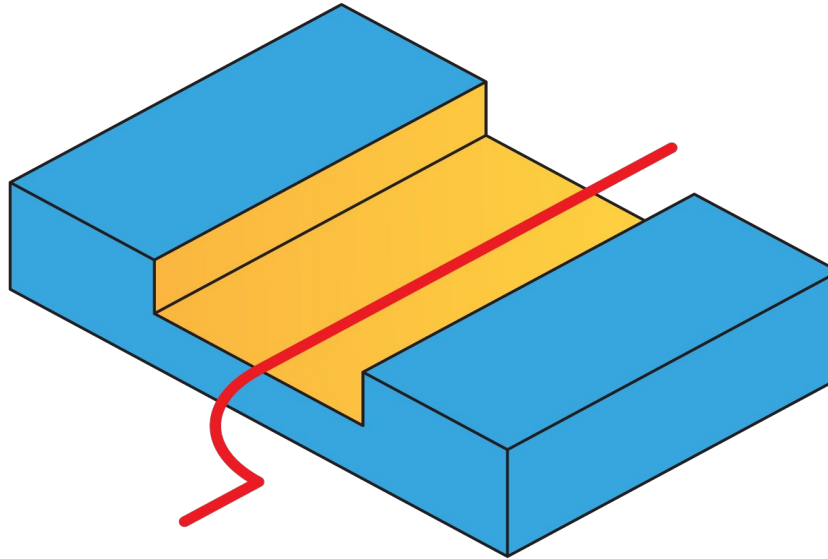
- **Constant tool loading when entering an open slot**

- **Special strategy for 2.5D thin wall machining**
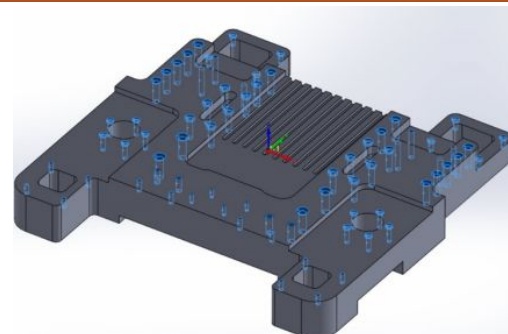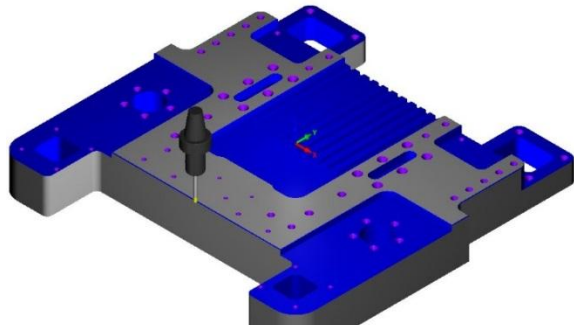
# Automatic Feature Recognition and Machining (AFRM)
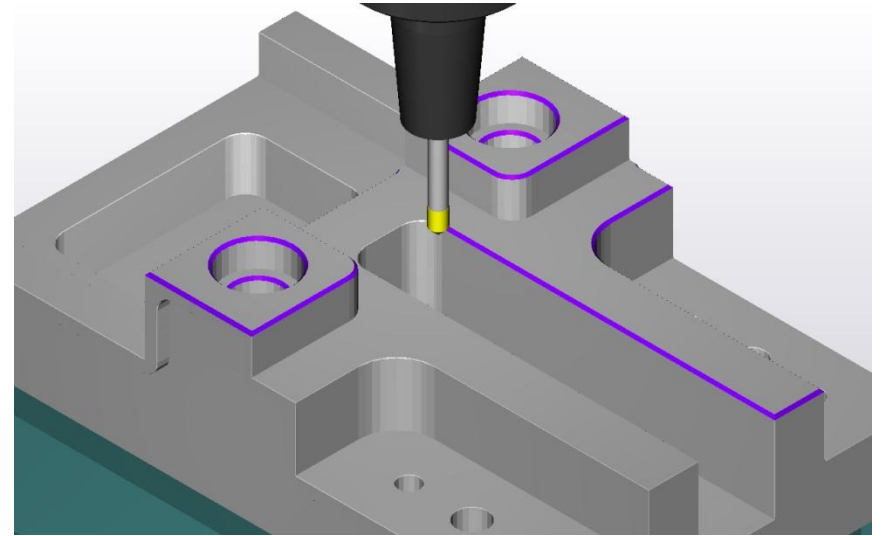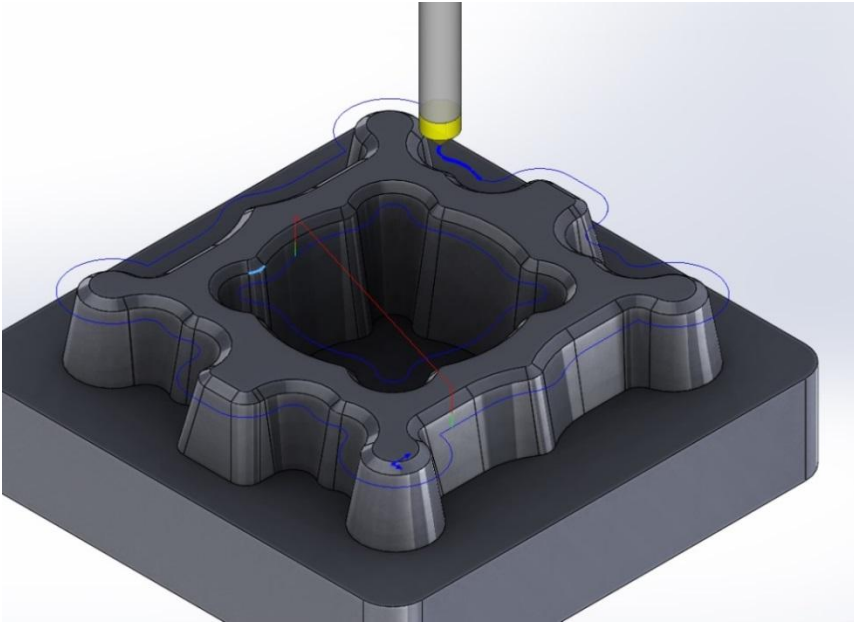
- **Automatic recognition and machining of edges where it is possible to apply chamfer**
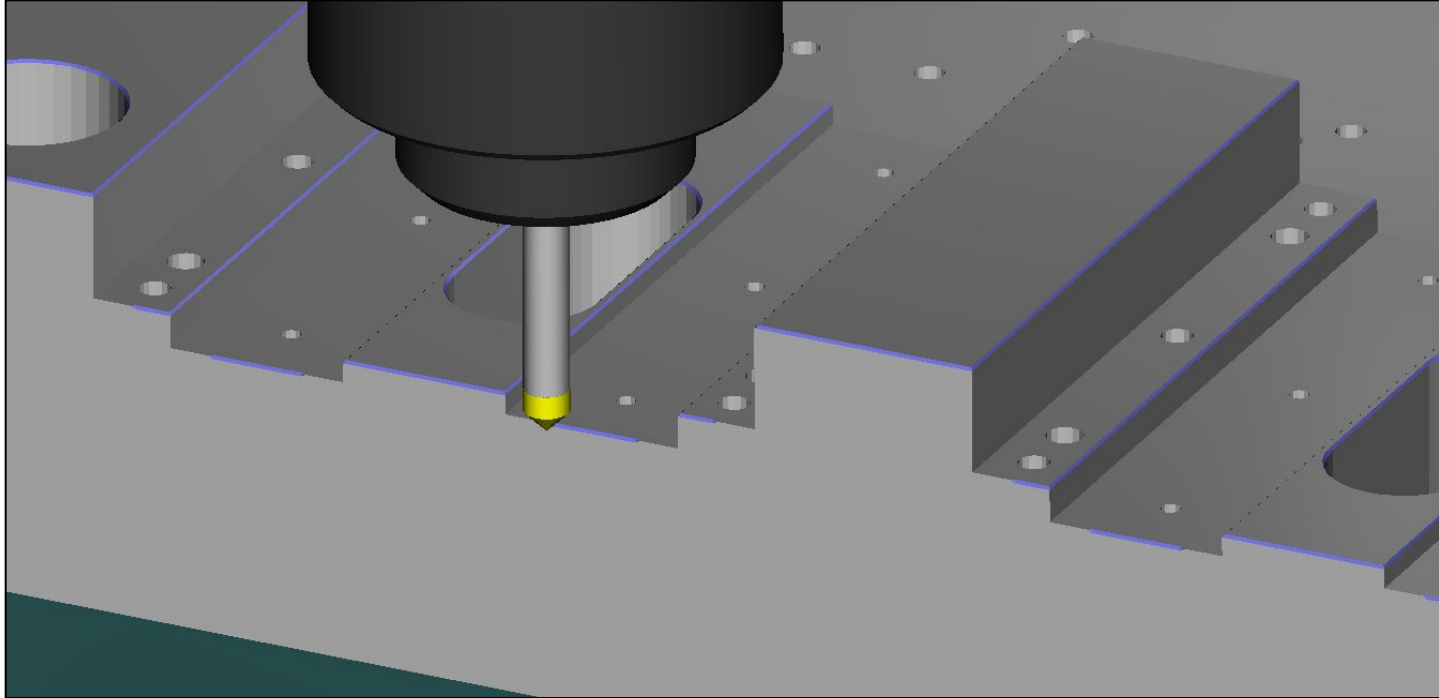
• **The Automatic recognition of edges is smart and avoids gouging the walls**
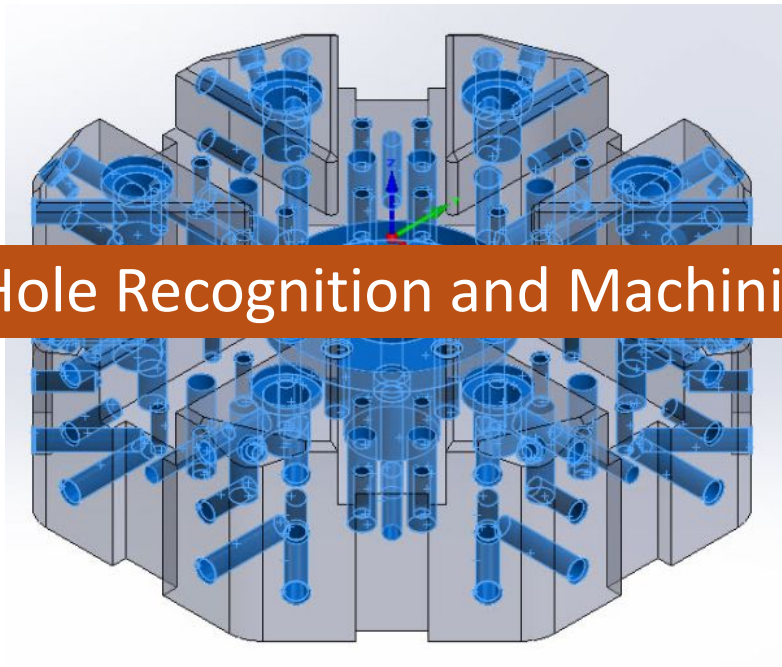
# Automatic Hole Recognition and Machining (AHRM)

InventorCAM's AHRM module is designed to automatically:

▪Classify Shapes and Groups of Holes

▪Convert to Machinable Features

▪Select and/or Create All Required Tools

▪Build Machining Technologies

▪Generate Machining Operations

▪Support all Work Position Orientations
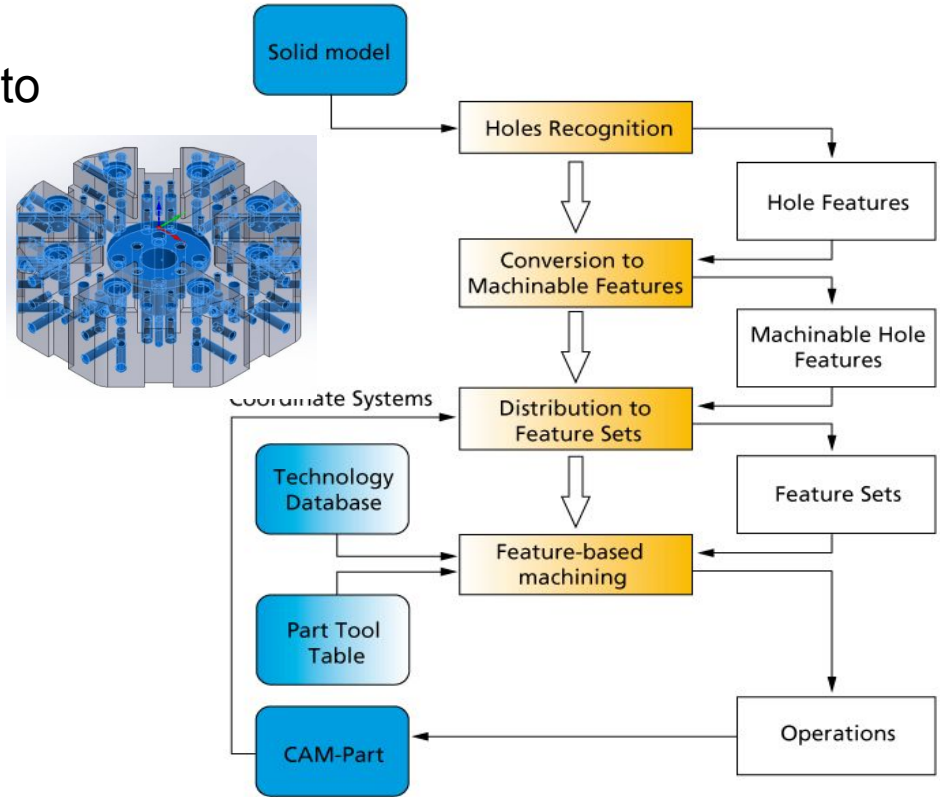
# AHRM review – Process steps
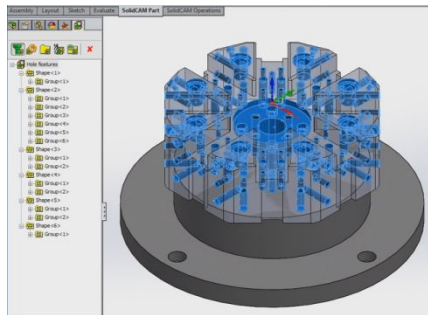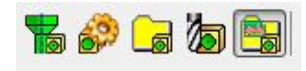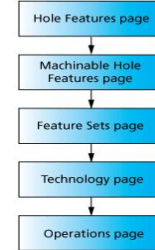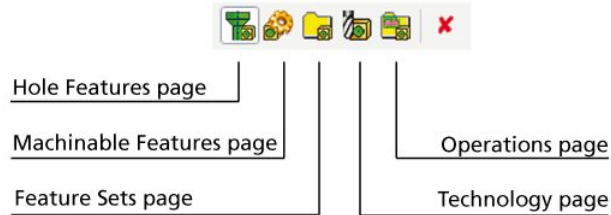
Step 1: Recognize Holes (Shapes & Groups)
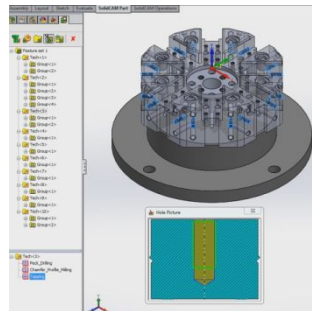
Step 2: Convert Holes to Machinable Segments
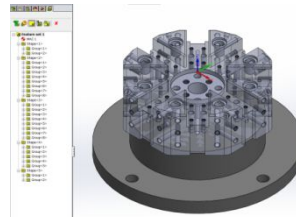
Step 3: Distribute Machinable Segments to Feature Sets
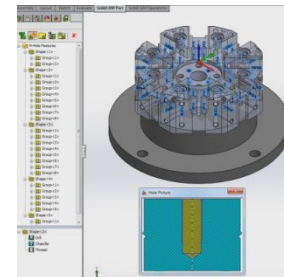
Step 4: Choose Technological Solution for Machinable Segments
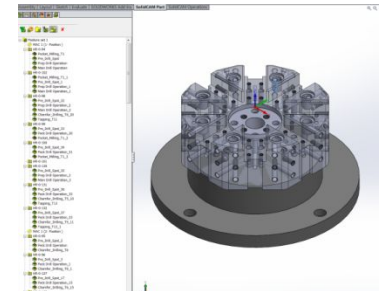
Step 5: Generate all Machining Operations

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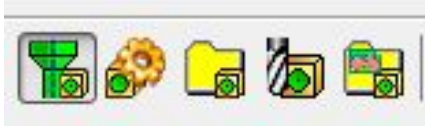
**Step 1:** Recognize Holes
(Shapes & Groups)
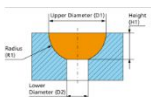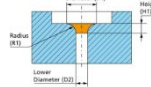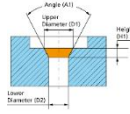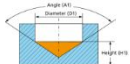
**Types of Hole Segments:**

- **Cylindrical**
- **Cone**
- **Chamfer**
- **Planar**
- **Torus**
- **Sphere**
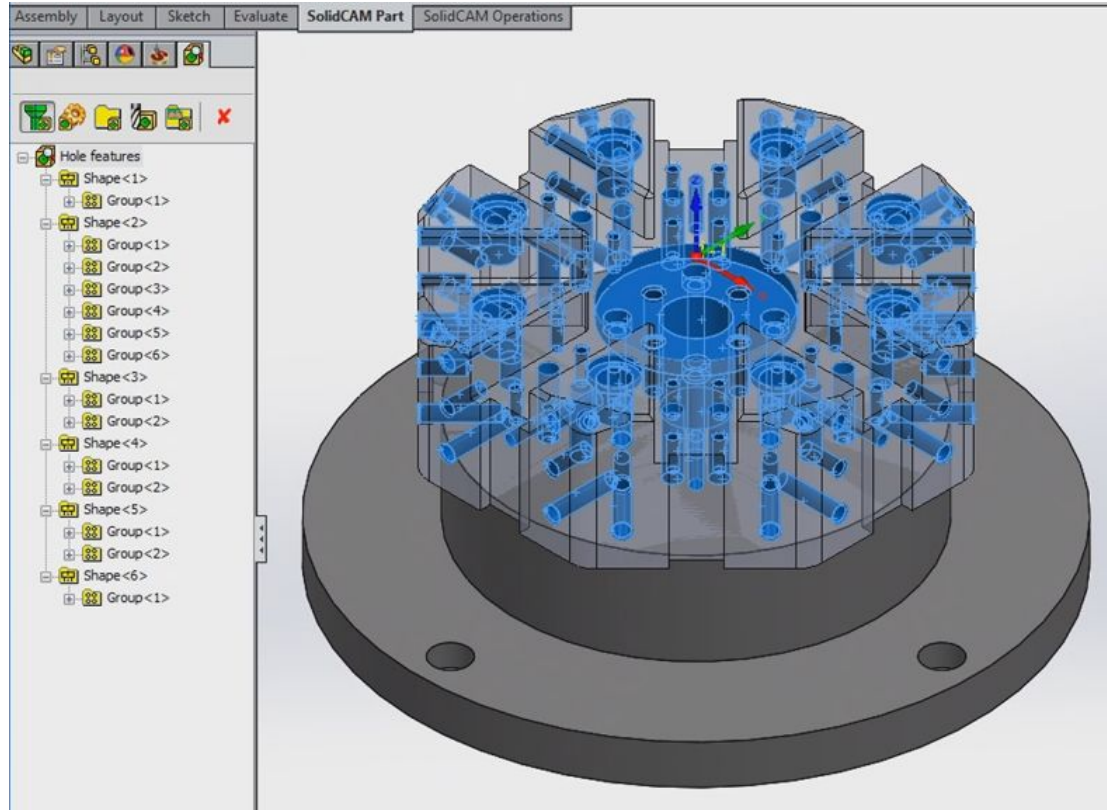
Step 2: Convert Holes to Machinable Segments

The **Machinable Hole Feature** consists of one or more **Machinable Hole Feature segments** that can be machined in one operation with the same tool.

- **Drill**
- **Chamfer**
- **Flat Cylinder**
- **Flat Chamfer**
- **Thread**
- **Reaming**
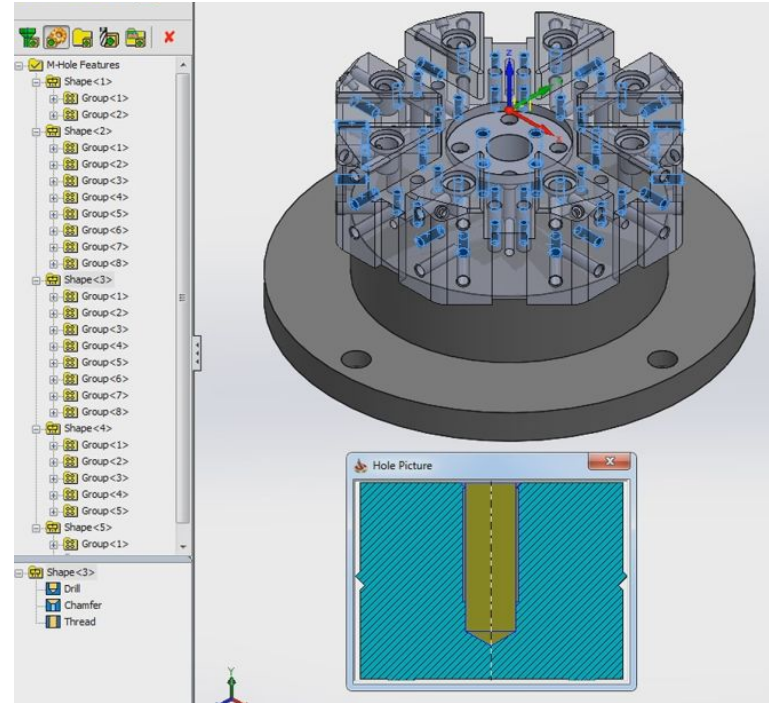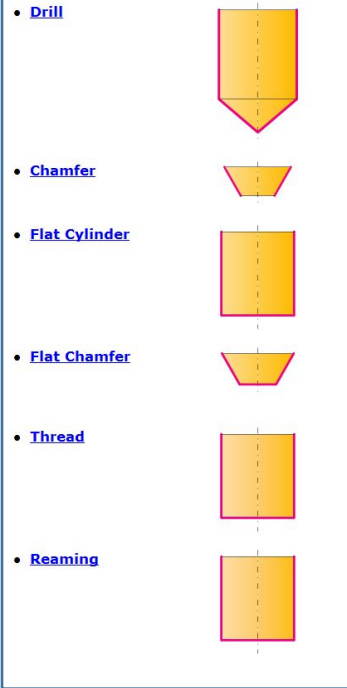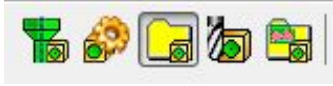
Step 3: Distribute Machinable segments to Feature sets

**Feature Set** is a number of Machinable segments that will be machined within the same setup using one Coordinate System.
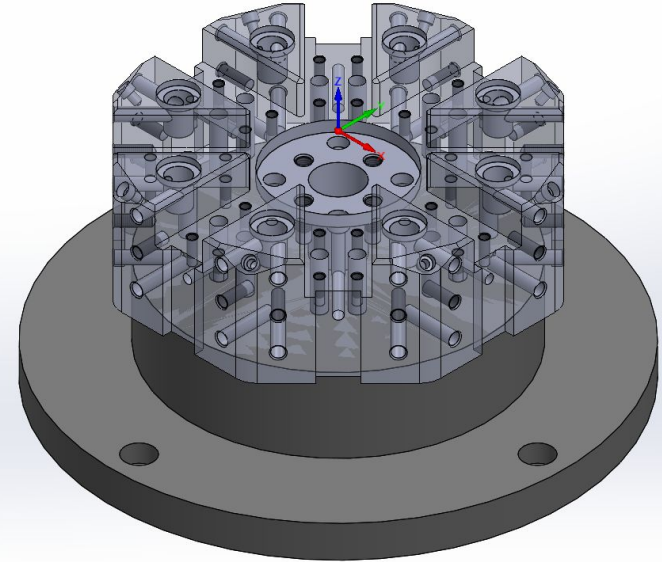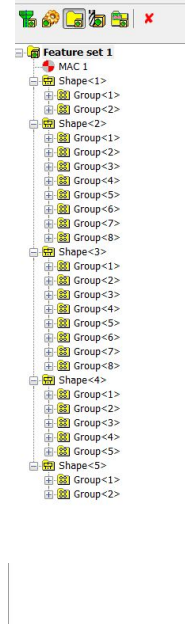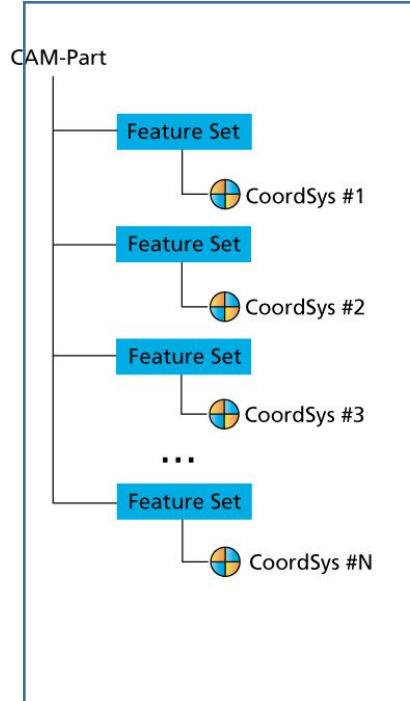
Step 4: Choose technological solution for Machinable Segments from Technology Data base
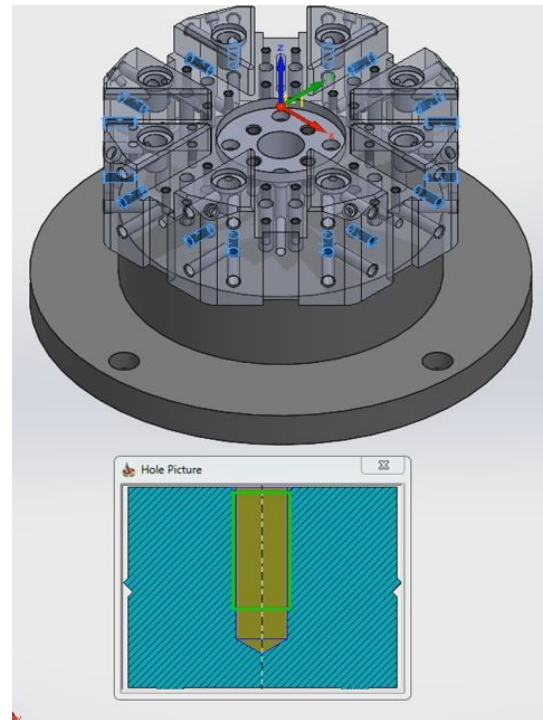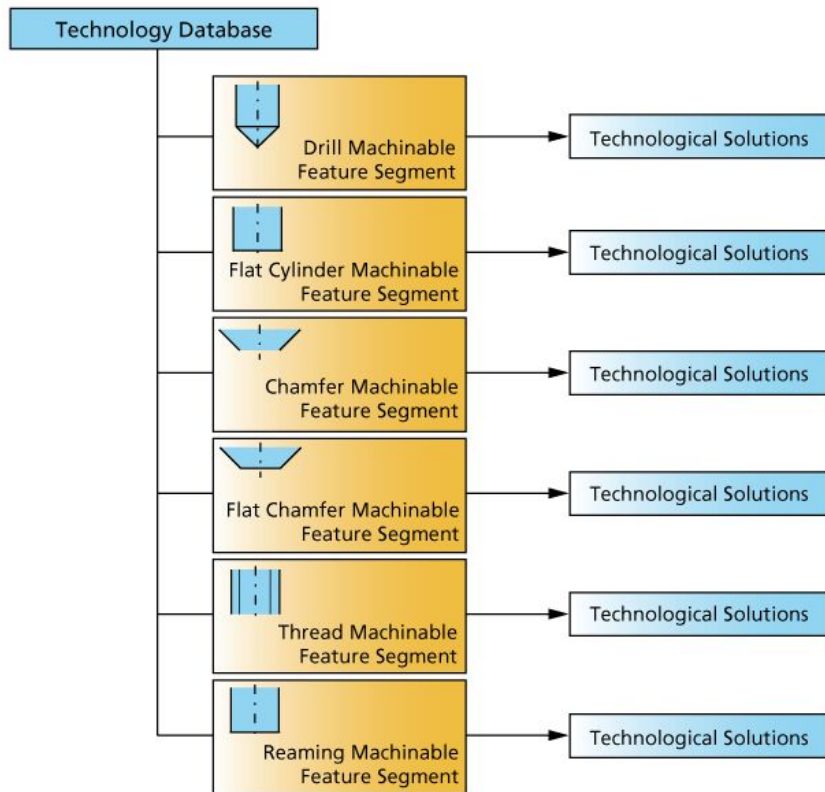
Technology Database

Drill Machinable Feature Segment → Technological Solutions

Flat Cylinder Machinable Feature Segment → Technological Solutions

Chamfer Machinable Feature Segment → Technological Solutions

Flat Chamfer Machinable Feature Segment → Technological Solutions

Thread Machinable Feature Segment → Technological Solutions

Reaming Machinable Feature Segment → Technological Solutions

Hole Picture
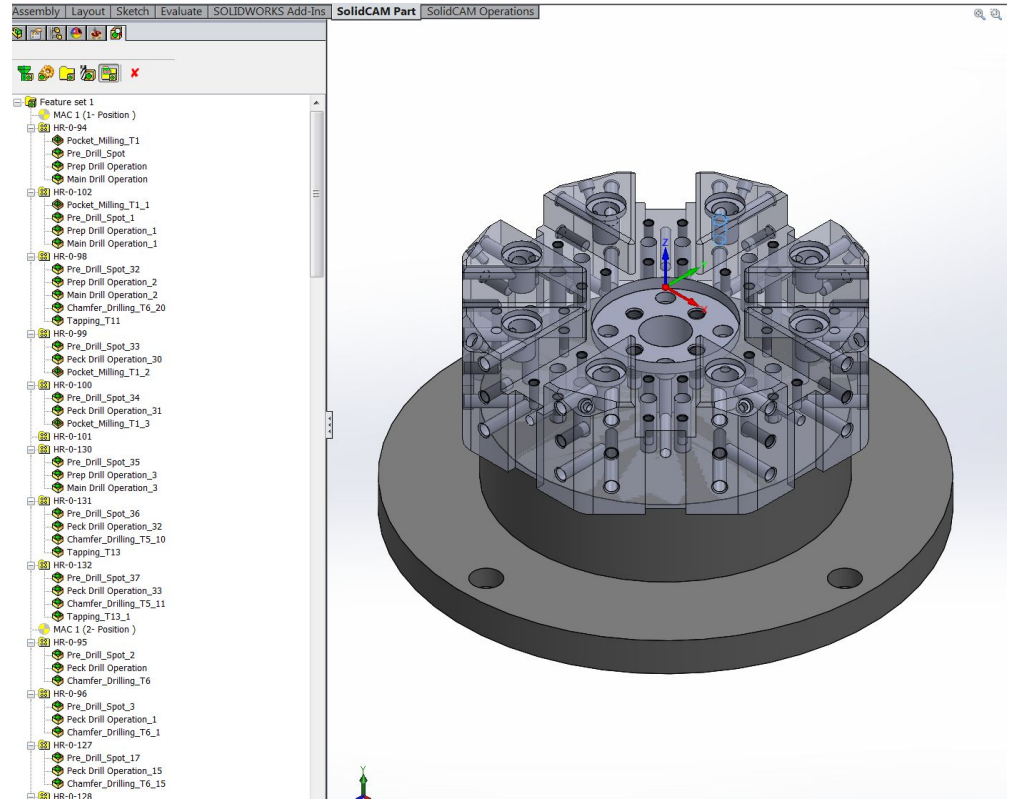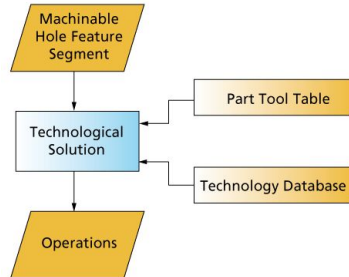
**Step 5**: Generate all machining operations
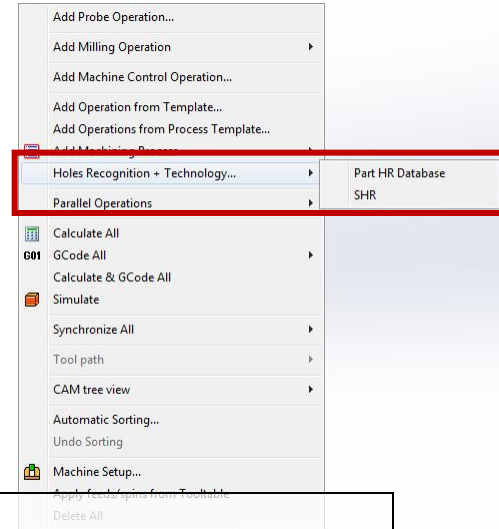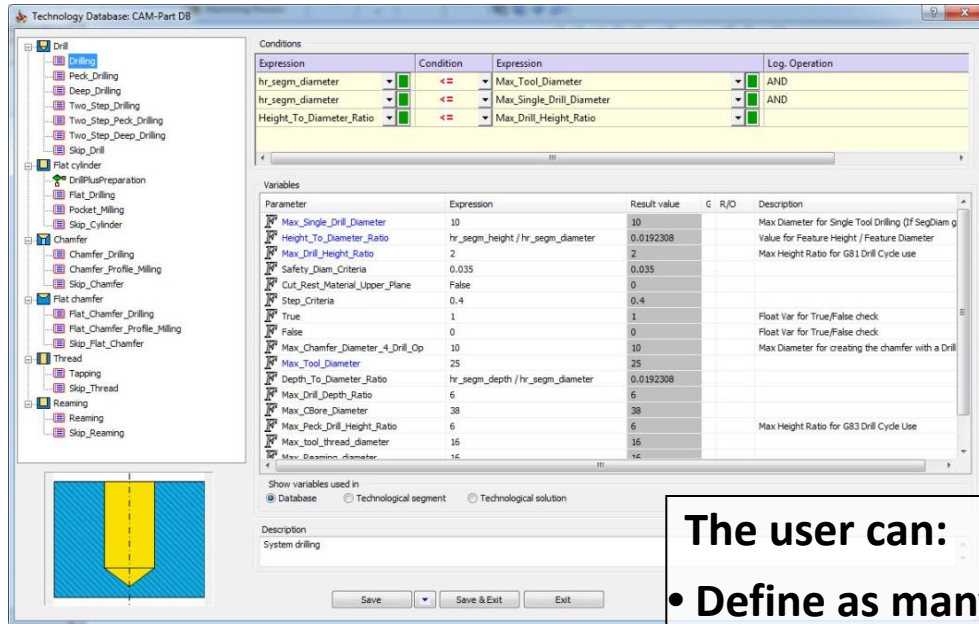
**The user can:**

- **Define as many DataBases as he wants**
- **Select any of them for the process**
- **Edit the "Part DataBase " Independently**
- **Save active DataBase As a NEW one**
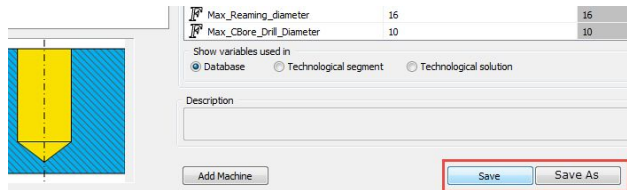
**Machinable feature (mf)**
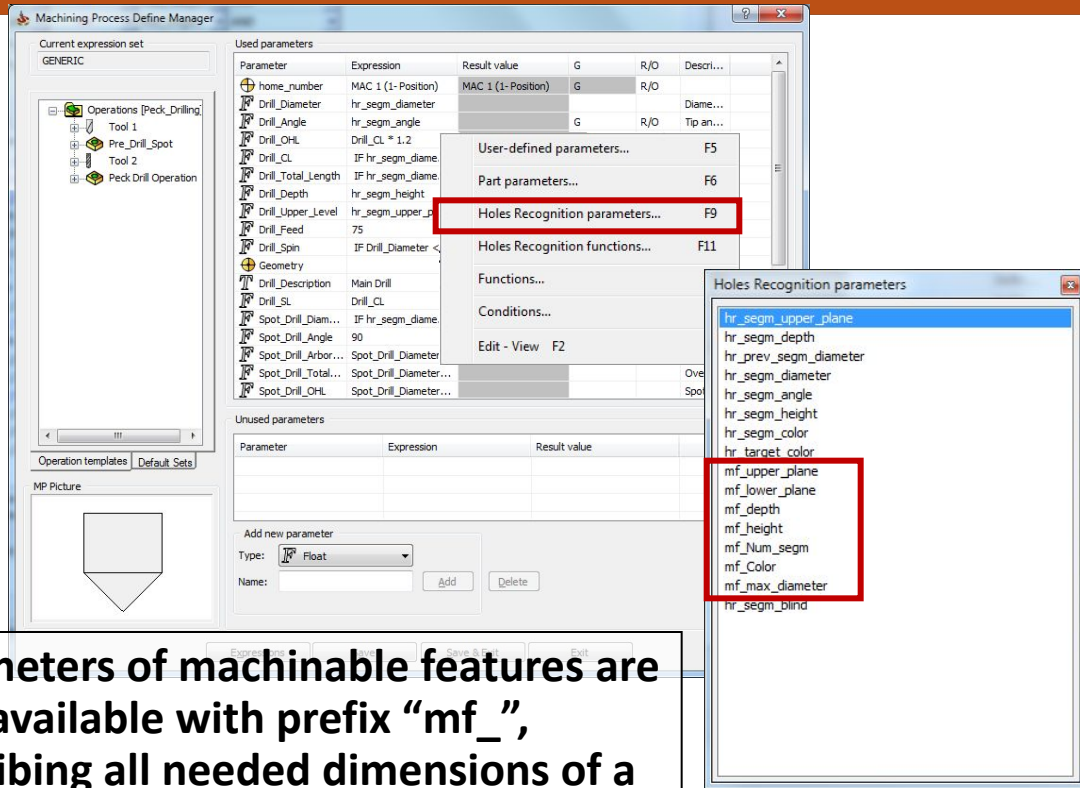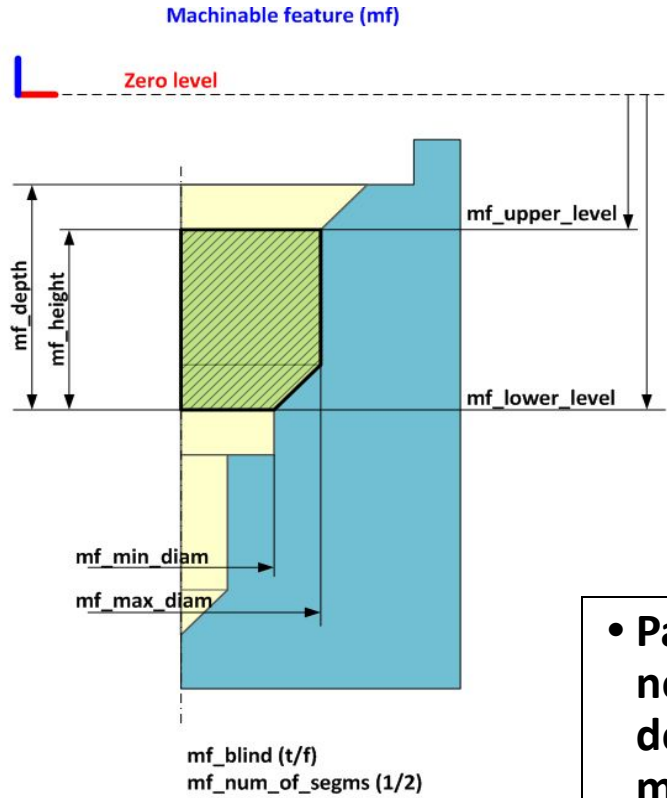
- **Parameters of machinable features are now available with prefix "mf_", describing all needed dimensions of a machinable feature (which is not always equal to the hole segment)**

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# AHRM New: Conditional Logic Support
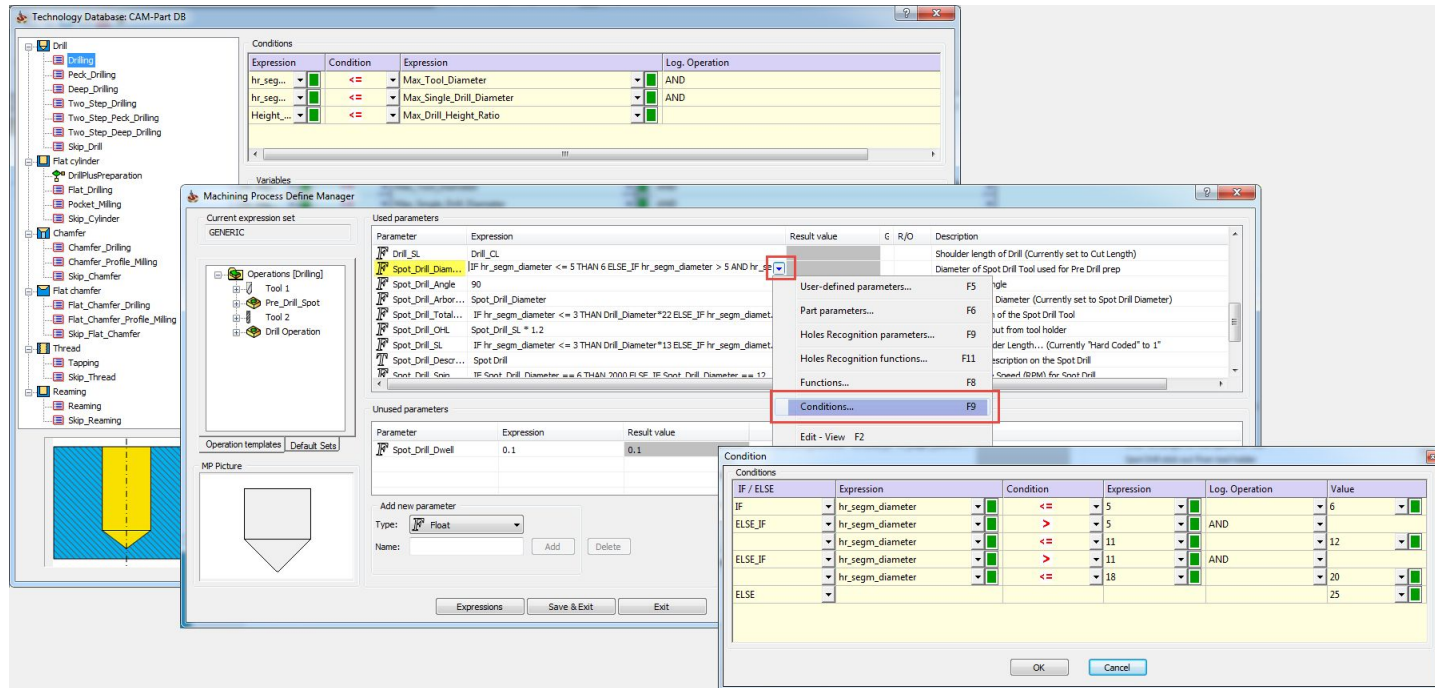
- **Apply different values to parameters, according to user-defined condition in the Machining Process of the AHRM (e.g. Enables Spot drills to be chosen according to hole size)**

# iMachining 2D & 3D

- **Speeding up iMachining calculation by using multi cores & multi threading for parallel calculation**
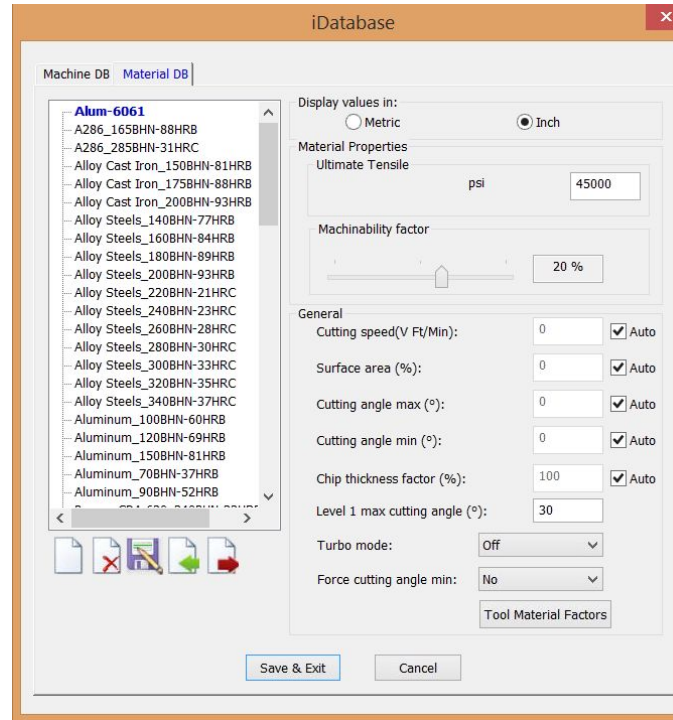
• **Increase/Decrease Cutting Conditions, based on Machinability of specific material**
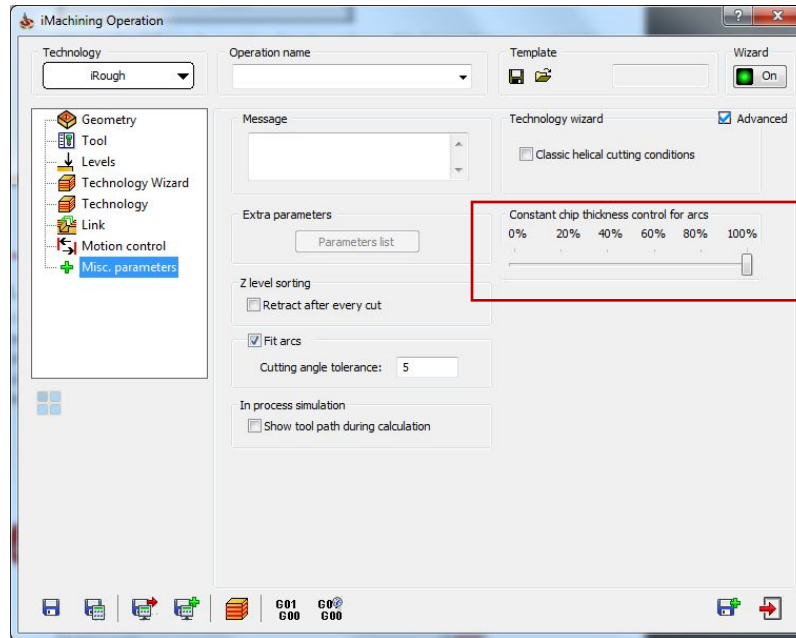
- **Controls the feed correction for arcs**
- **Value of 0 means no feed rate correction, resulting in faster cutting and higher tool wear**
- **Value of 100 means complete correction, slower cutting but less tool wear**
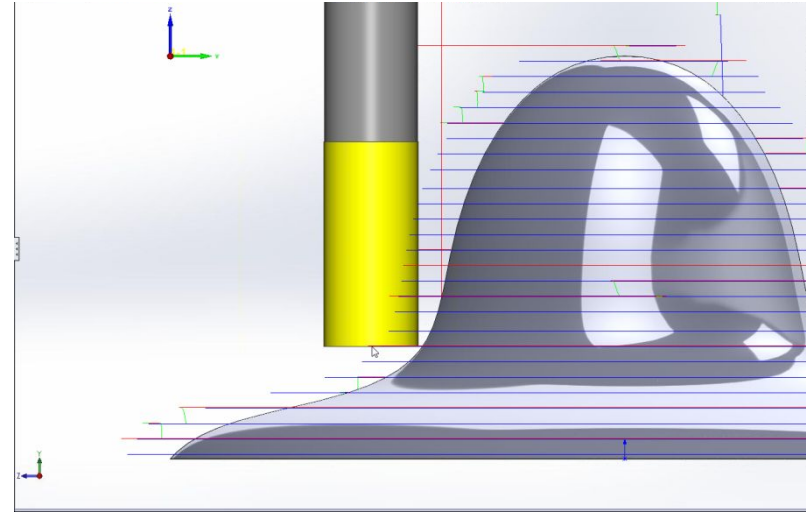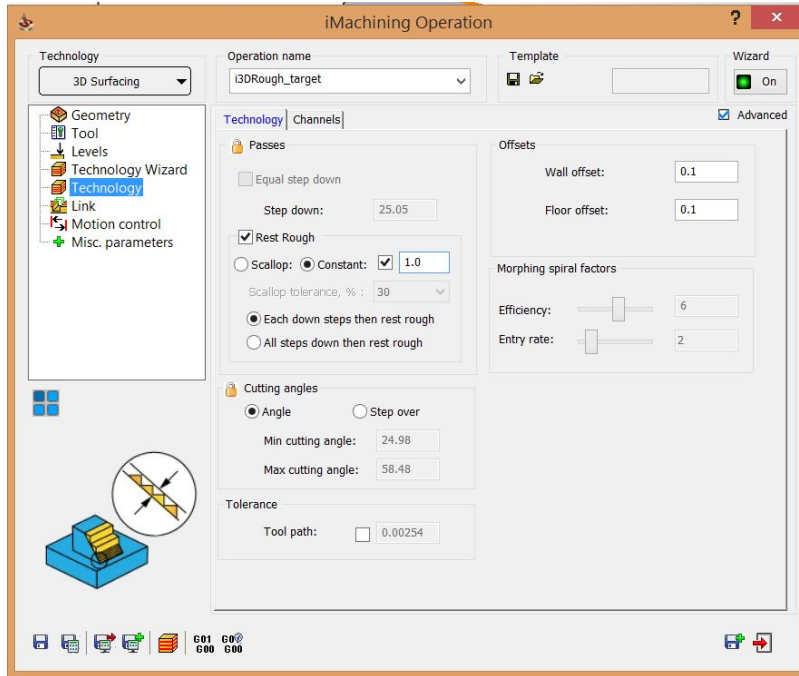
- **iMachining 3D option: Constant Set up (as alternative to Scallop)**
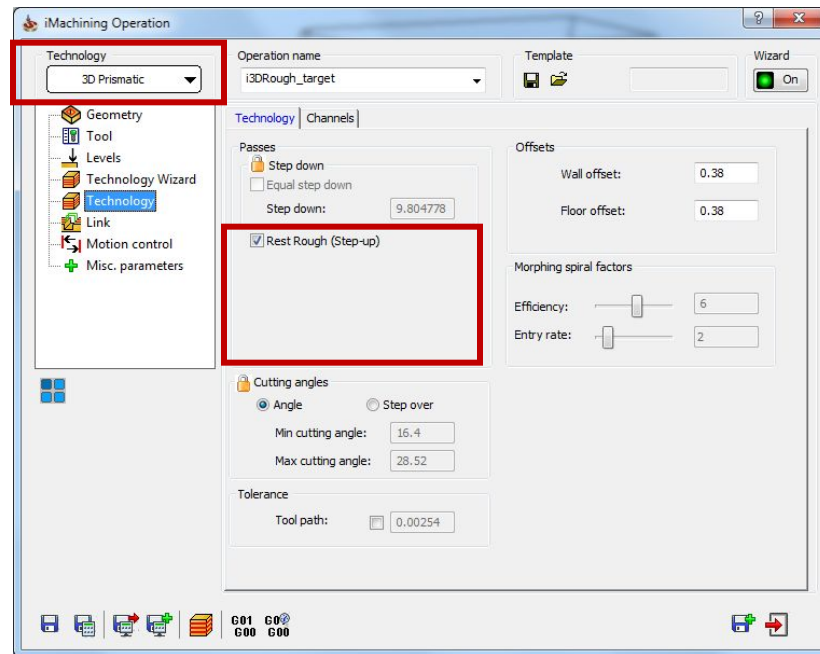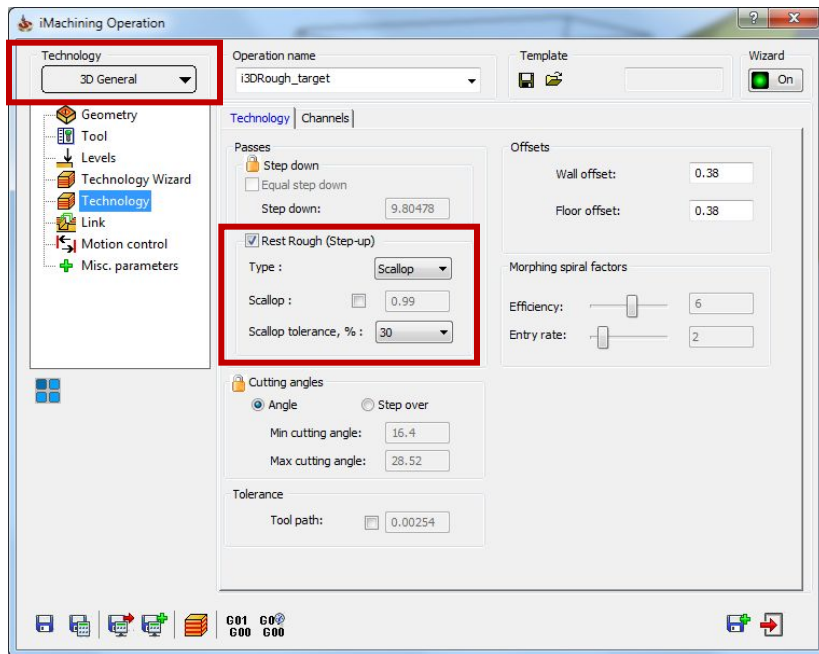
- **iMachining 3D technology for Prismatic Part Machining with automatic scallop calculation**
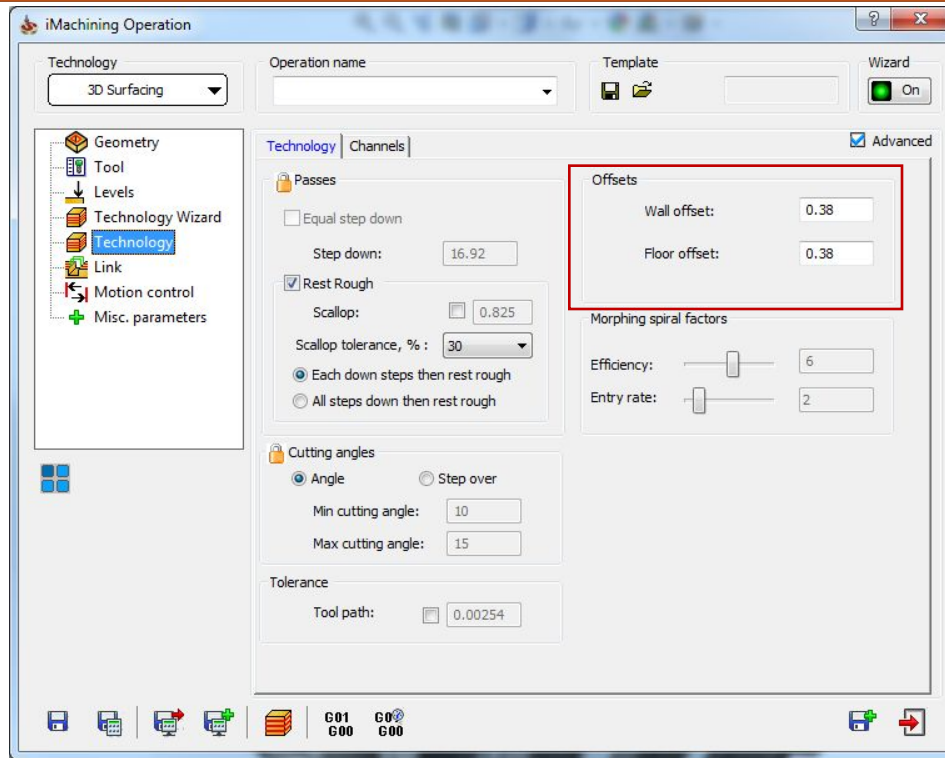
- **Enables you to define a Floor offset that is separate from the Wall offset**

# Show Cutting angle in simulation of iMachining
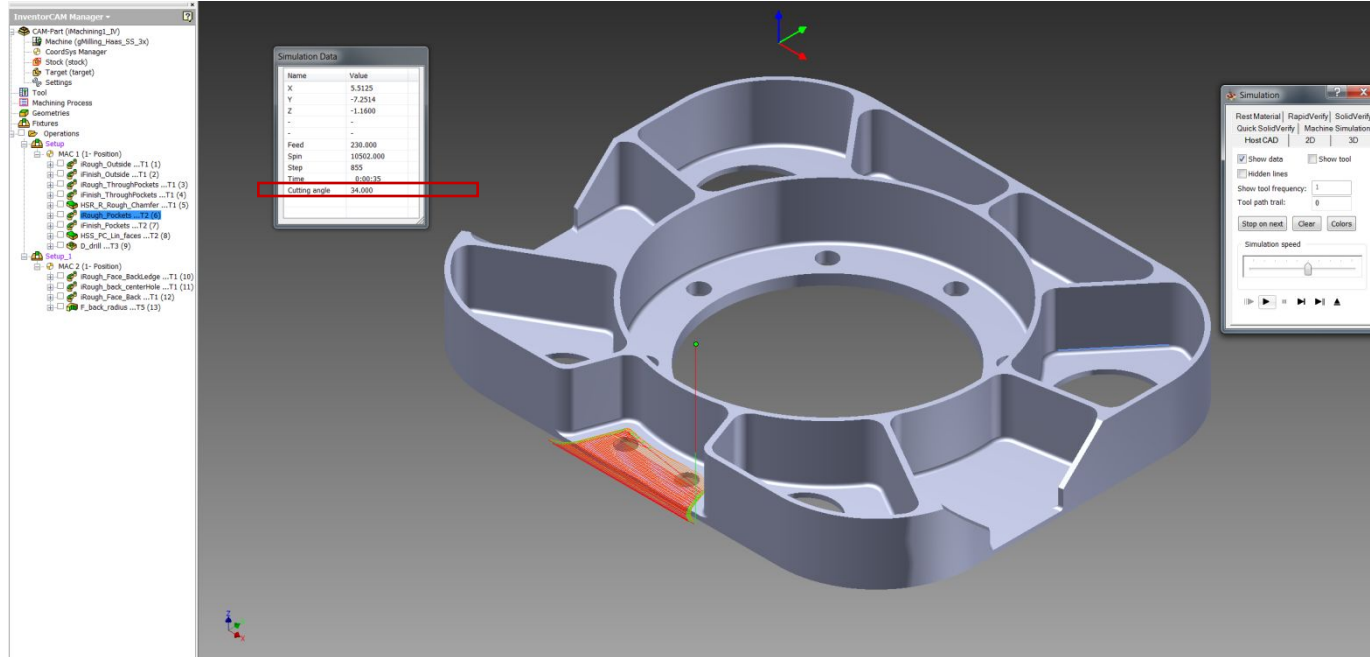


**• Showing the cutting angle in iMachining simulation**

# 3D Milling
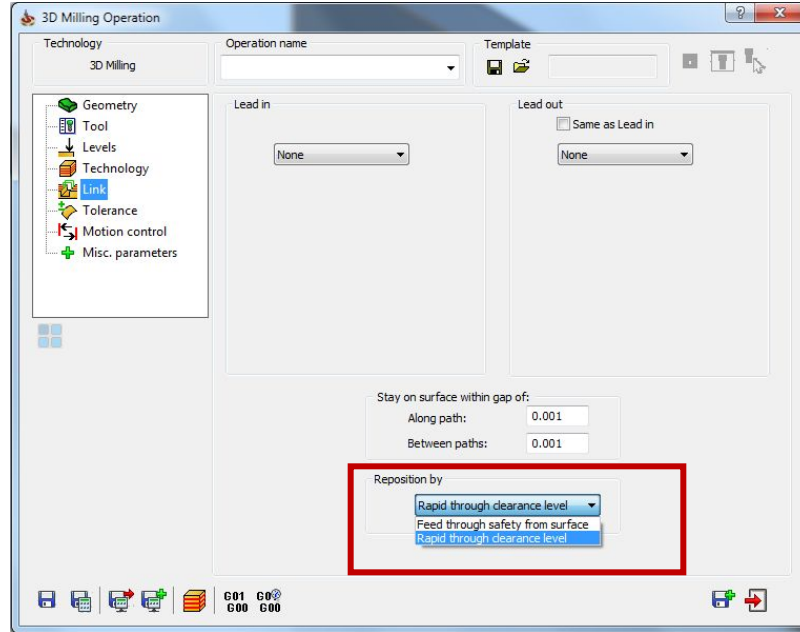
**2 options of tool reposition:**

•**By Rapid move through clearance plane**

•**By Feed move through saftey distance from the surface**

# HSR/HSM
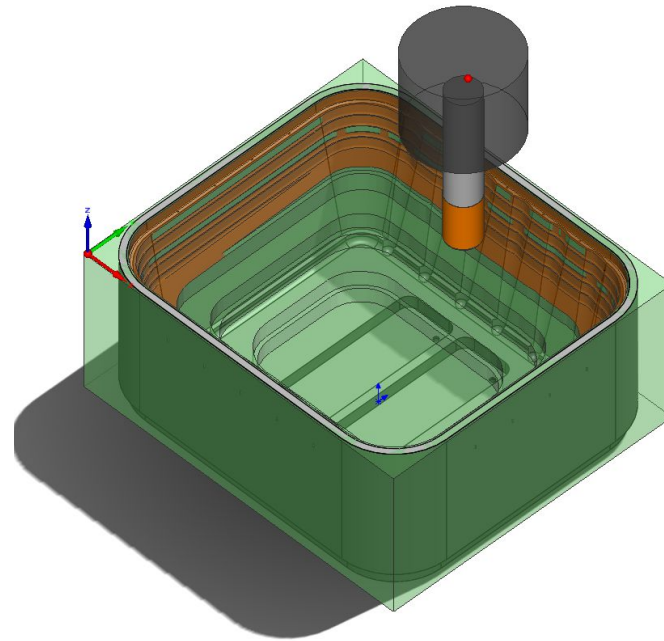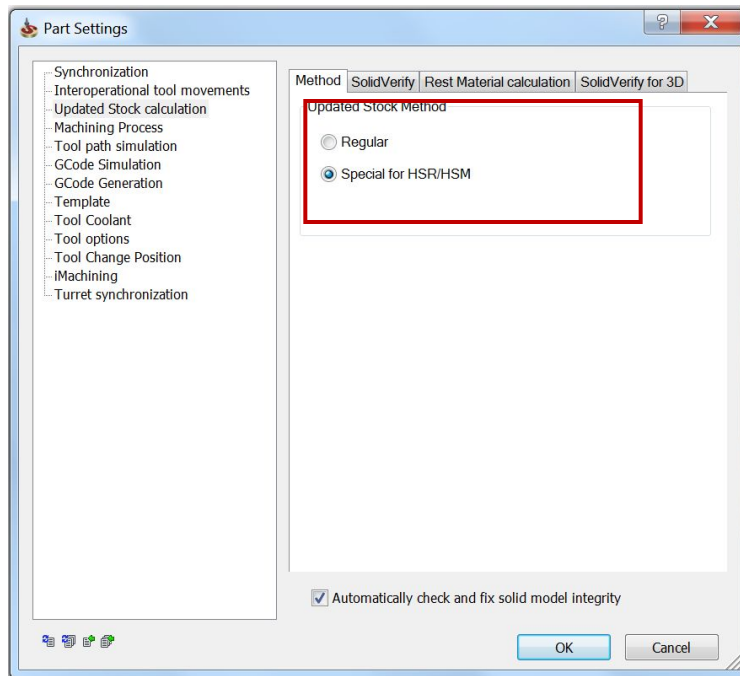
- **Choose in Settings option of speeding up Updated stock calculation, if all previous operations are HSR/HSM**

- **Saving on average 40% in updated stock calculation time**
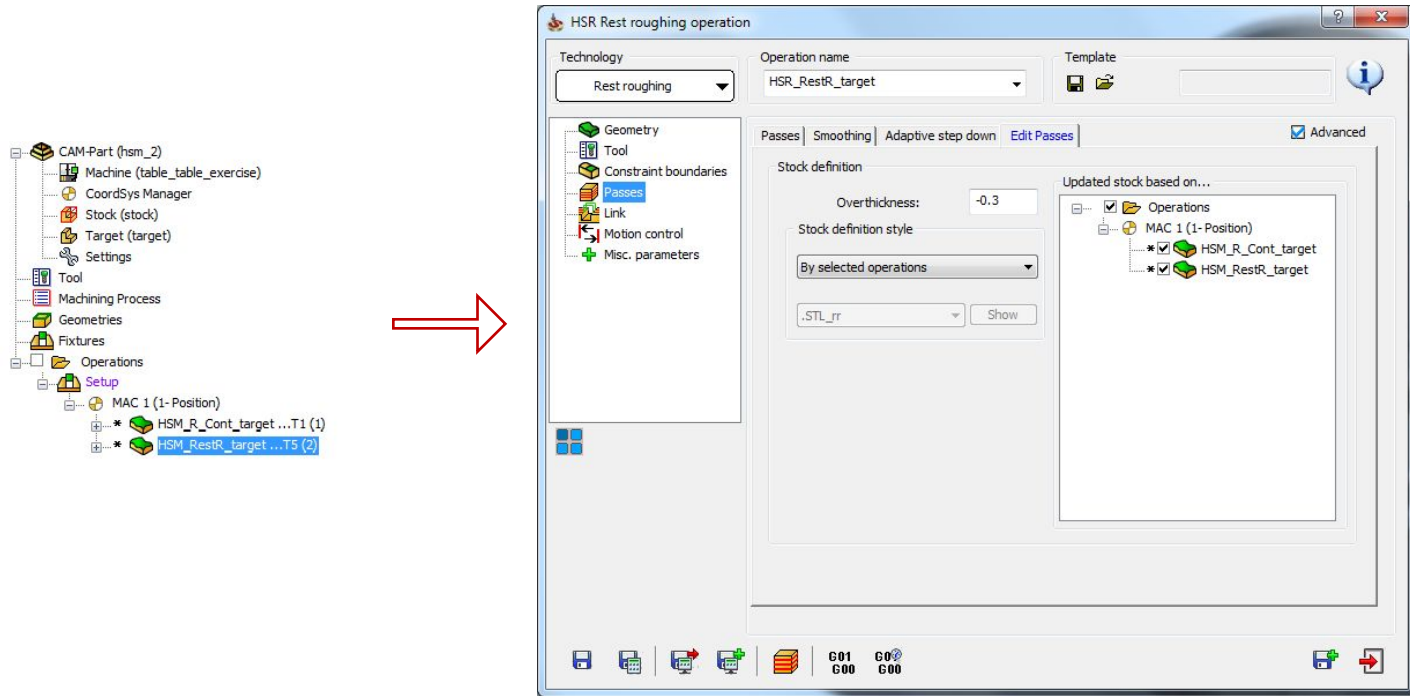
- **Even if previous operations are not calculated , it's possibe to select them for further updated stock calculation in HSR Rest Roughing**
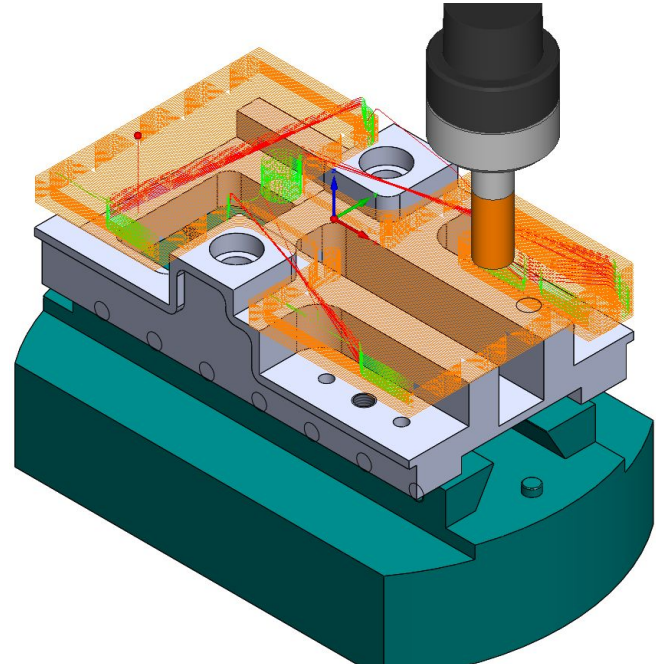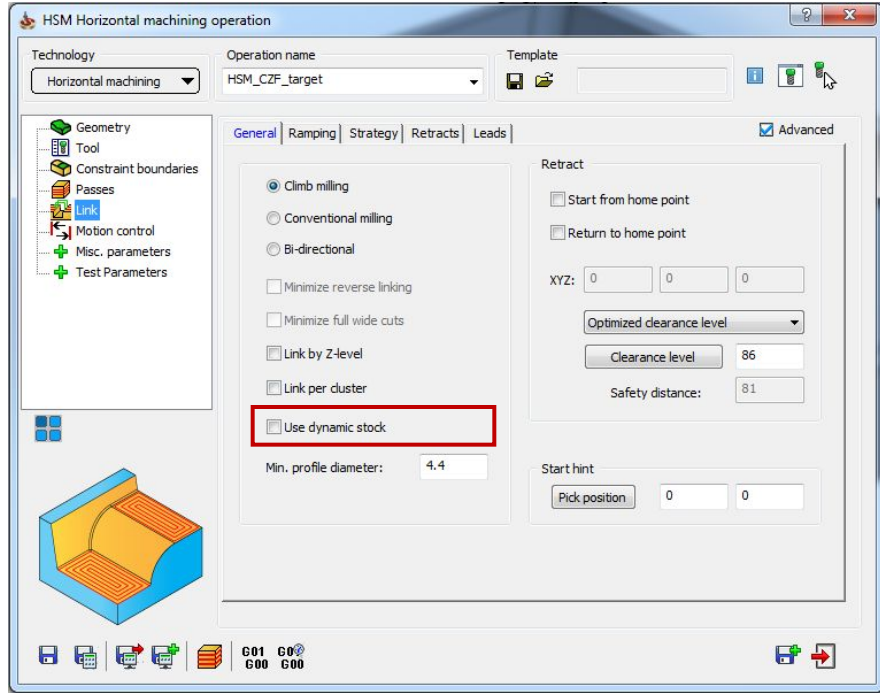
- **Links the passes using dynamic stock(updated stock), instead of static stock (the initial stock), resulting in a very efficient toolpath**

# HSM: Ramping options added to Constant-Z machining
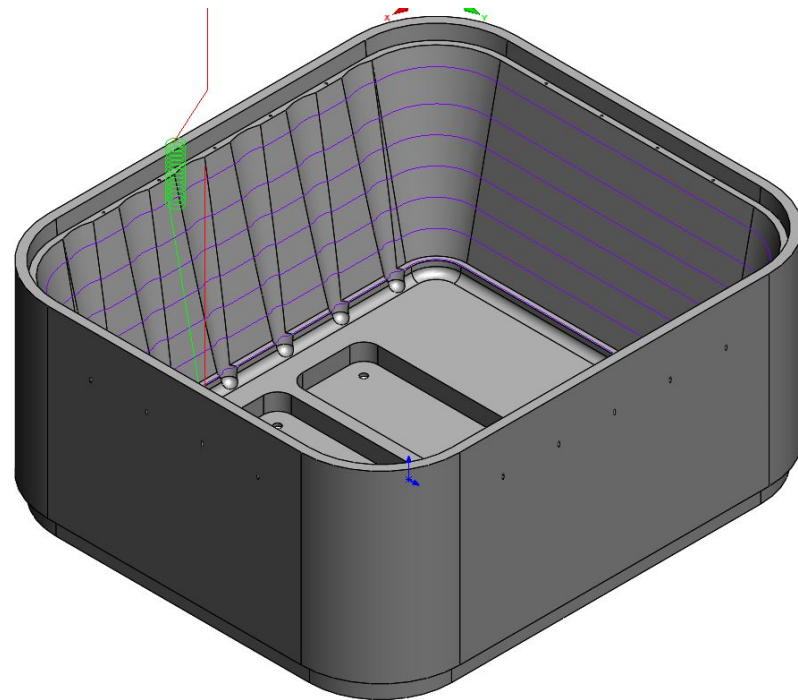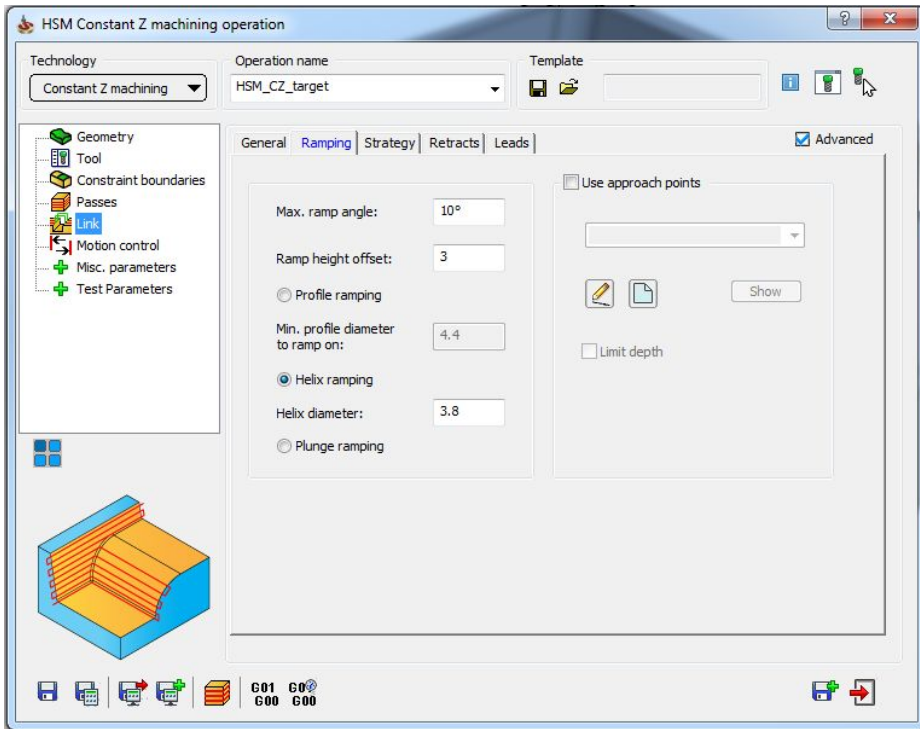


- **Ramping options, added to HSM Constant Z machining, similar to HSR operations, are useful to increase tool life, when finishing is done immediately after roughing**
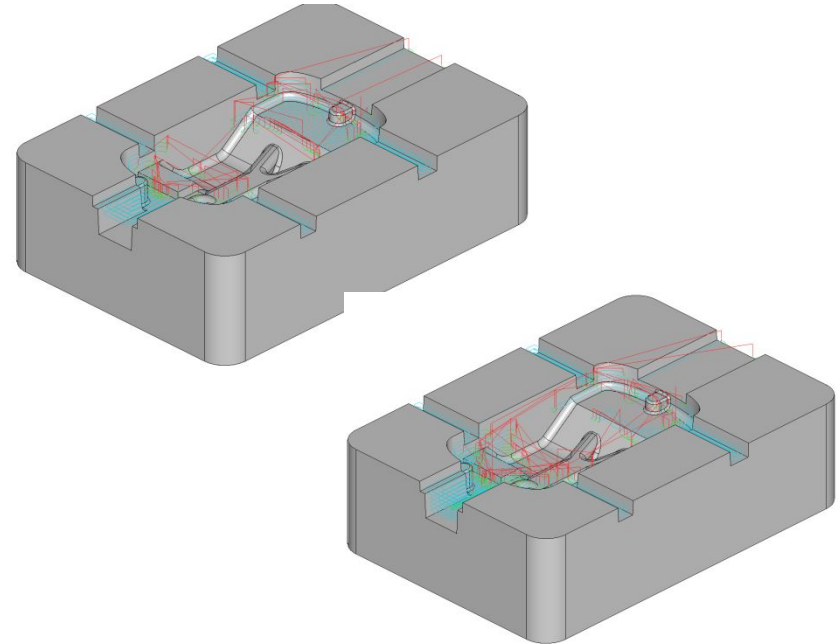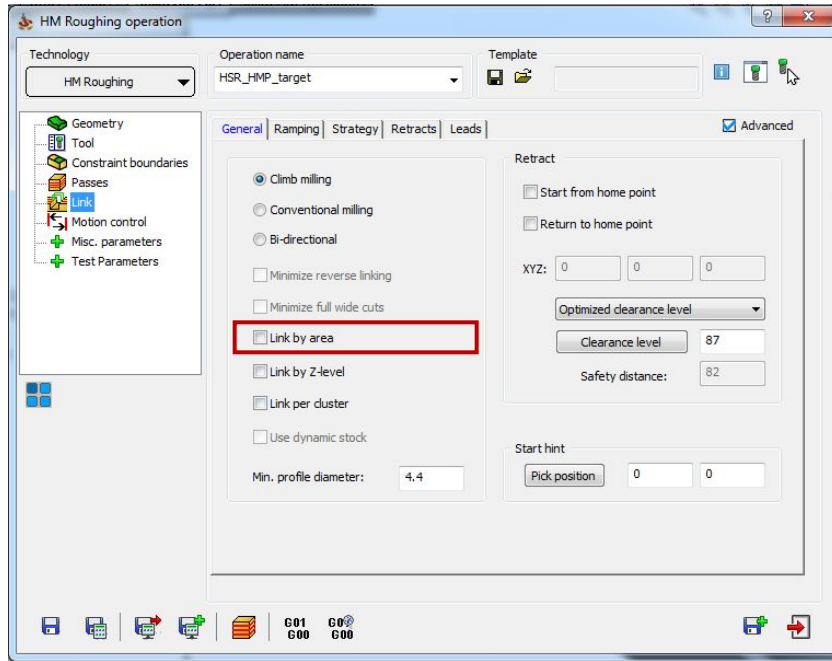
• **Pockets are machined independently, but within a pocket, strict Z level ordering is enforced**

# Sim 5X Milling & HSS

# Feed Control
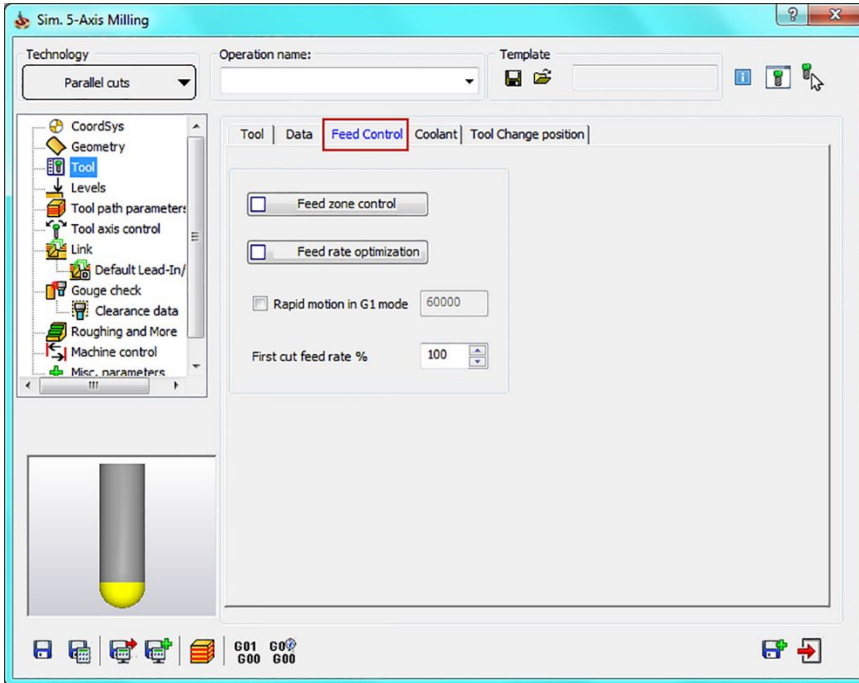


- **New Feed Control tab added.**

- **Feed Control enables the user to reduce/ increase cutting feed inside & outside defined volumes.**
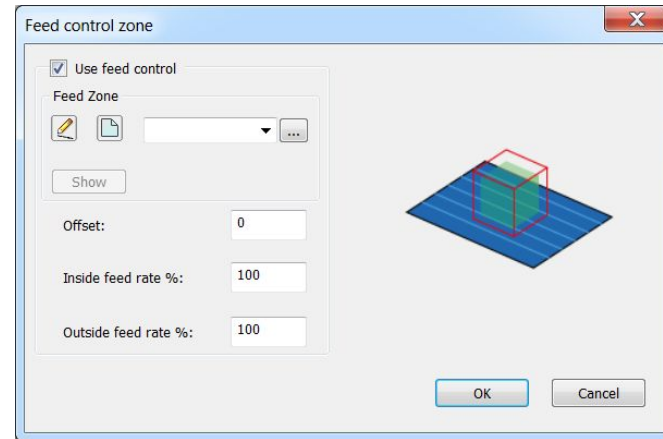
- **Surface quality tab: New option of <u>Synchronize points</u> added.**

- **Option is available when the Distance check box is ON.**
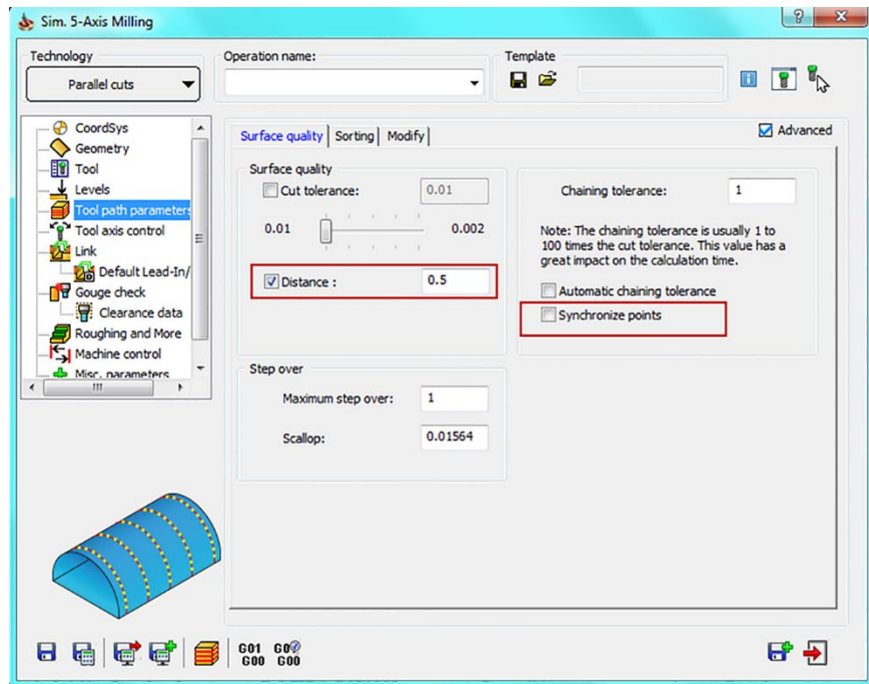


- **The Synchronize points option enables you to equalize the spacing and number of points on all contours, thus getting better surface quality**
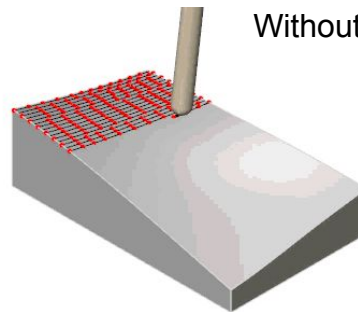
Without Synchronization
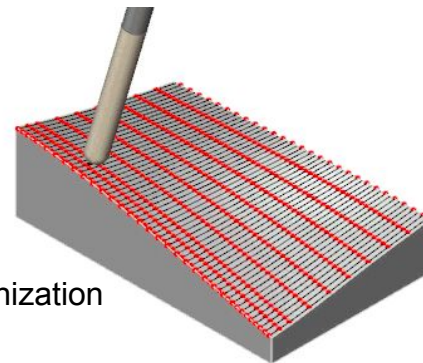


With Synchronization
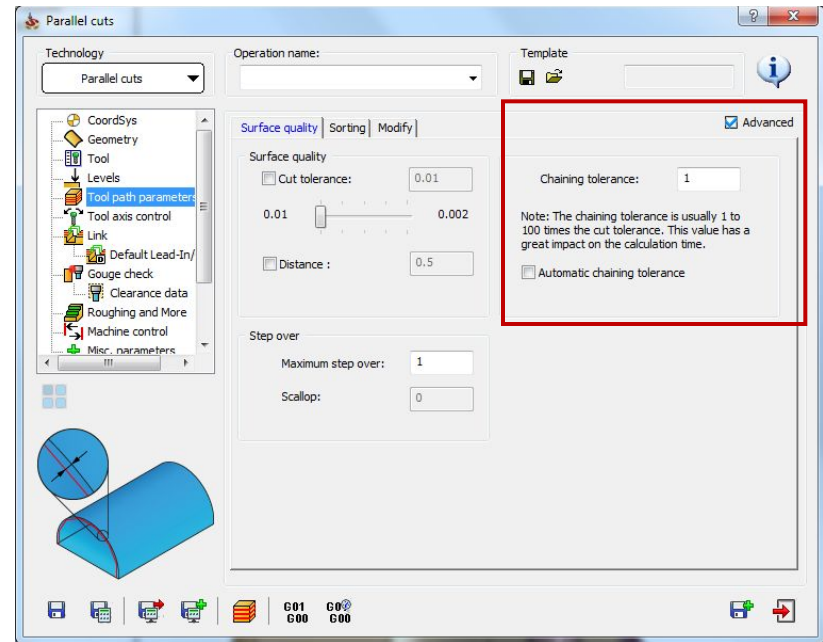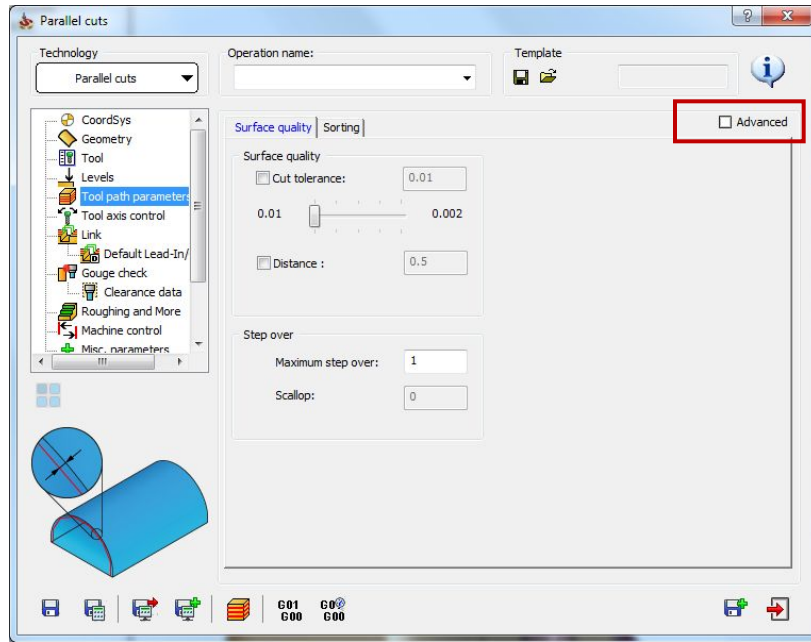
- **Only most used options are open in the standard interface, making it easier for customers**

- **Advanced button opens additional control options, needed by advanced users**

- **In Tool axis direction/Tilted through lines: New option of <u>Always closest to surface</u> is added in the *Use tilt through*.**

- **This option enables you to tilt the tool as defined in the Tilt lines section, maintaining always the tool at closest distance to the surface, avoiding sudden tilting**

- **This option maintains the tilt by using the tilt lines that are at the closest distance to the surface.**

- **In Tool axis direction: New option of <u>Tilted relative to contact point</u> is added.**

- **This option is similar to "Tilted Relative to Cutting Direction", however in this option instead of cutting direction, the tool tilting will be relative to the contact point of the tool with the surface.**

# New operation: Multiaxis Roughing
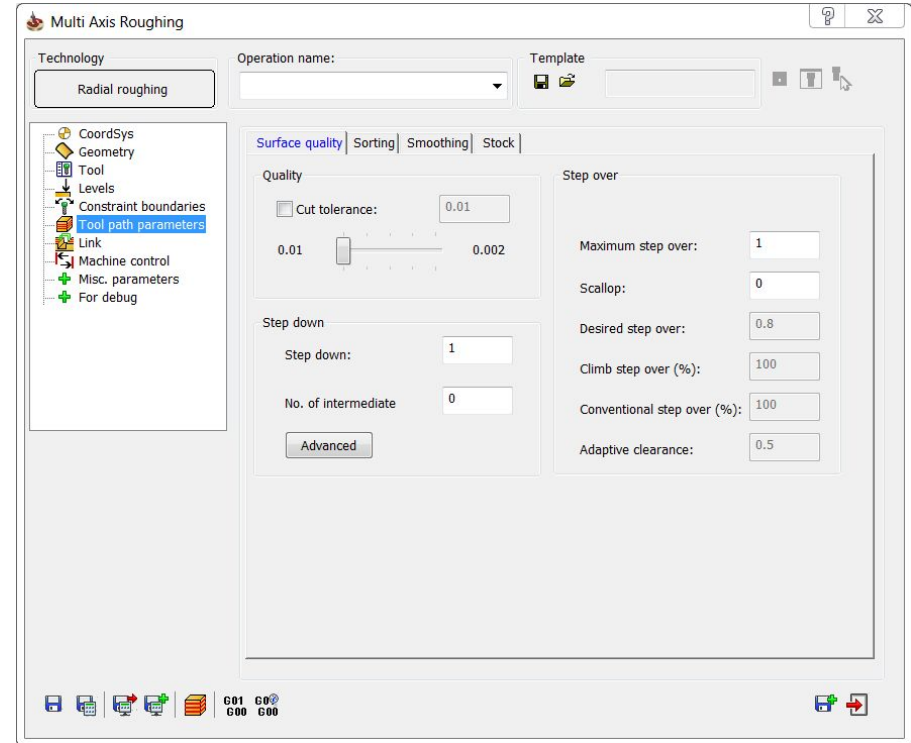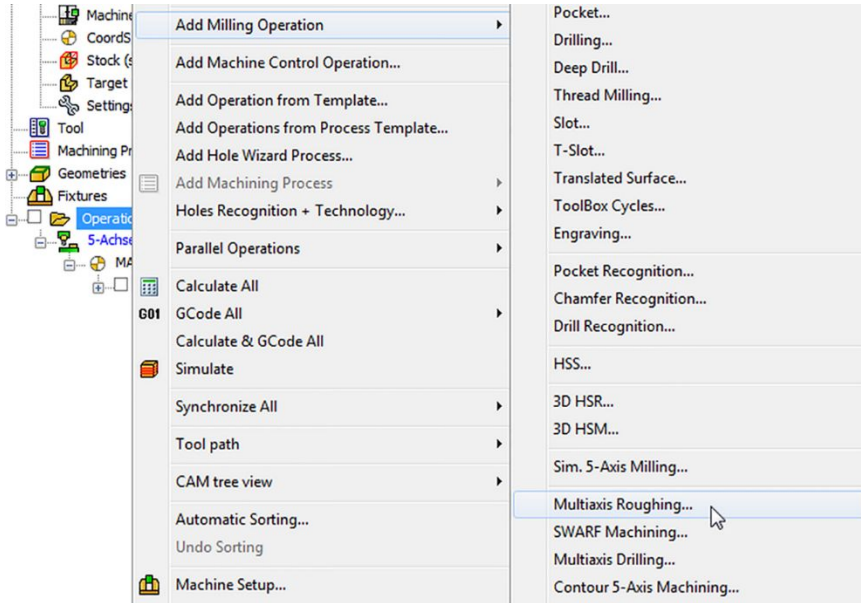


□ **New Multiaxis Roughing operation is added for Roughing of parts, that need multiple setup if done in 3X.**
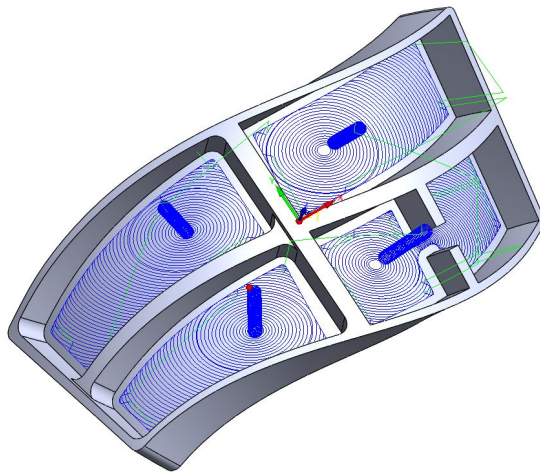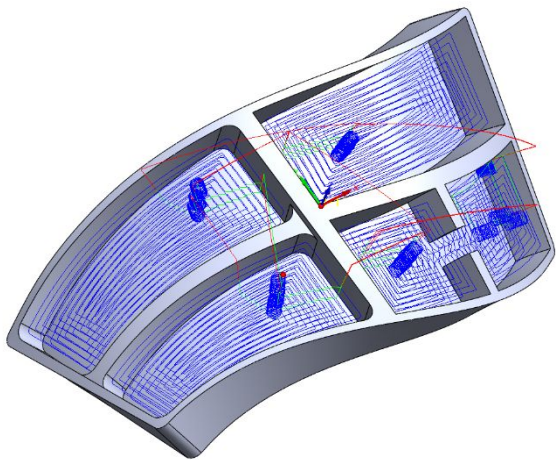
☐**This operation creates a multiaxis tool path that can be used to rough out pocket shaped geometries in full 5 Axis.**

☐**The user has to specify the floor, wall and ceiling surfaces and the system automatically creates the roughing tool path.**

☐**Adaptive roughing feature also available.**
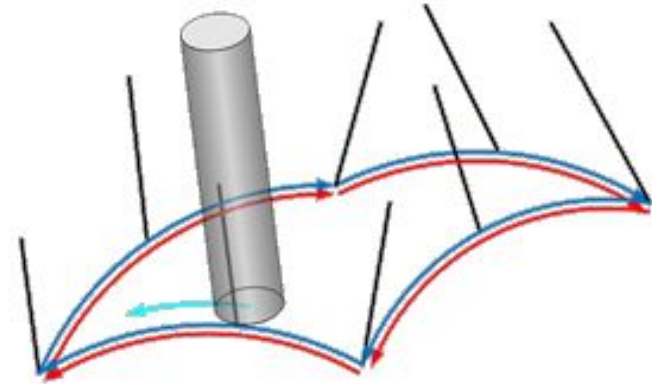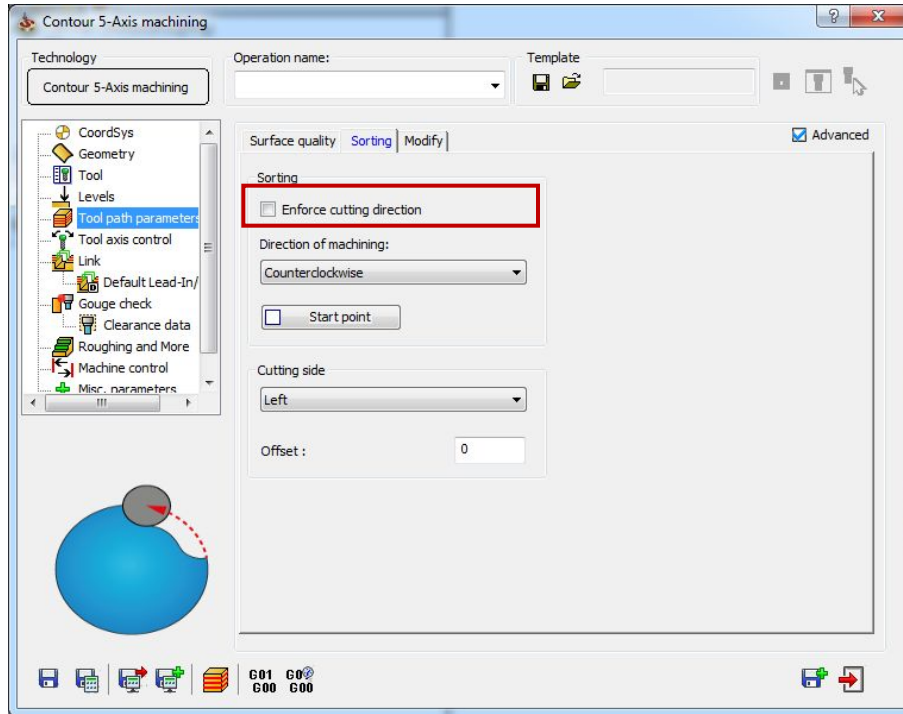
- **Direction is set according to direction of machining, ignoring the selected chain direction**
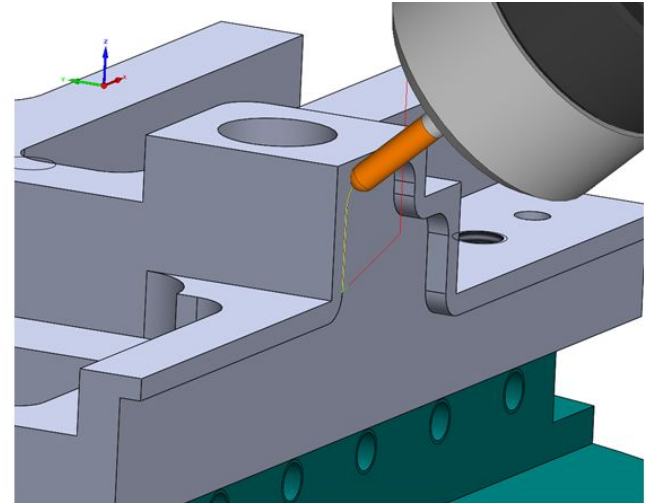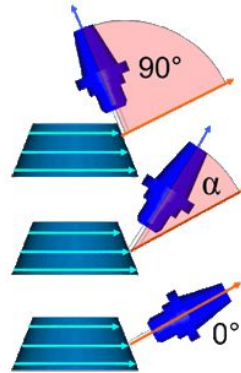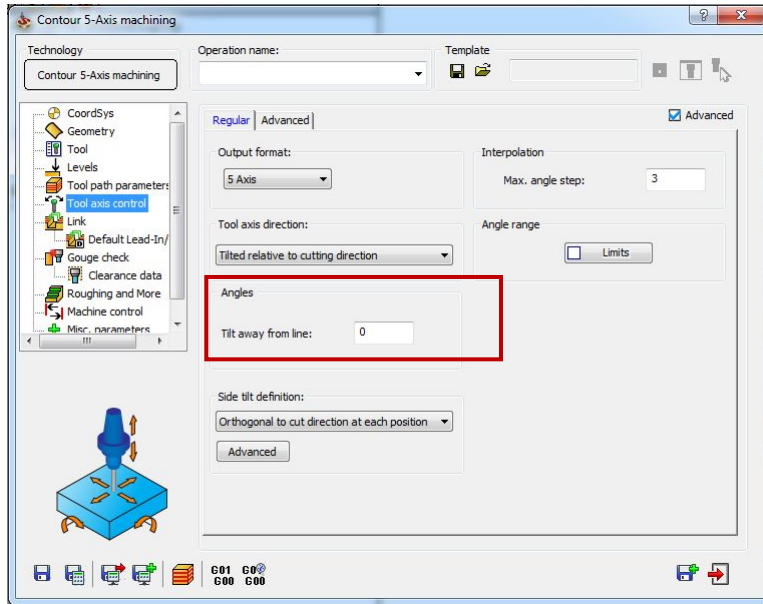
• **Tilt away from line defines the side tilt of the tool relative to the contour**

- **Machine angle limit is now controlled by two parameters: minimum and maximum angle, rather than by only one limit angle in older versions, giving much better control of angles in CNC machines that have less swivel**

• **Safety distance is divided into two fields: Entry & Exit safety distance, providing better control**
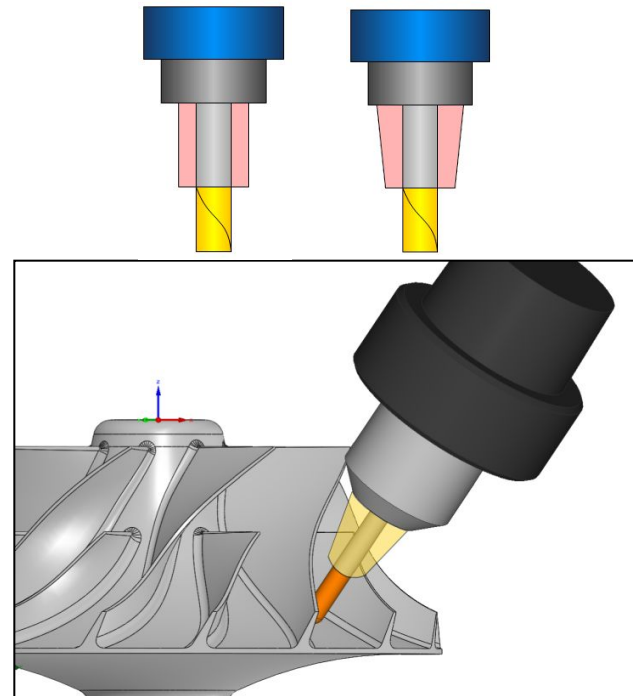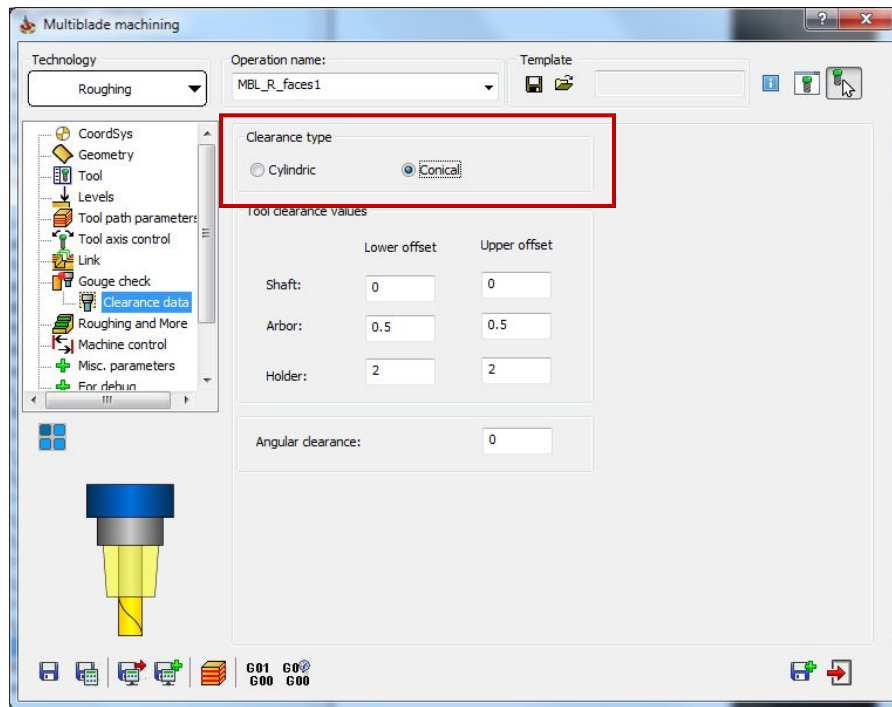
- **A new Tool Clearance type, Conical, is added to enable cutting more material and working deeper, while avoiding gouging**
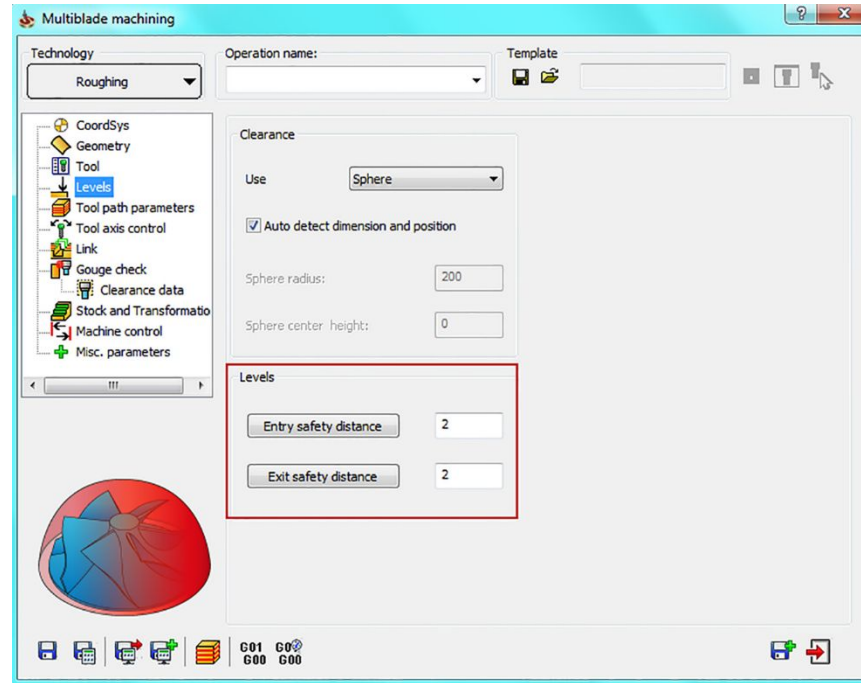
☐ **Levels page: New Levels section is added to enable entry and exit safety distance.**
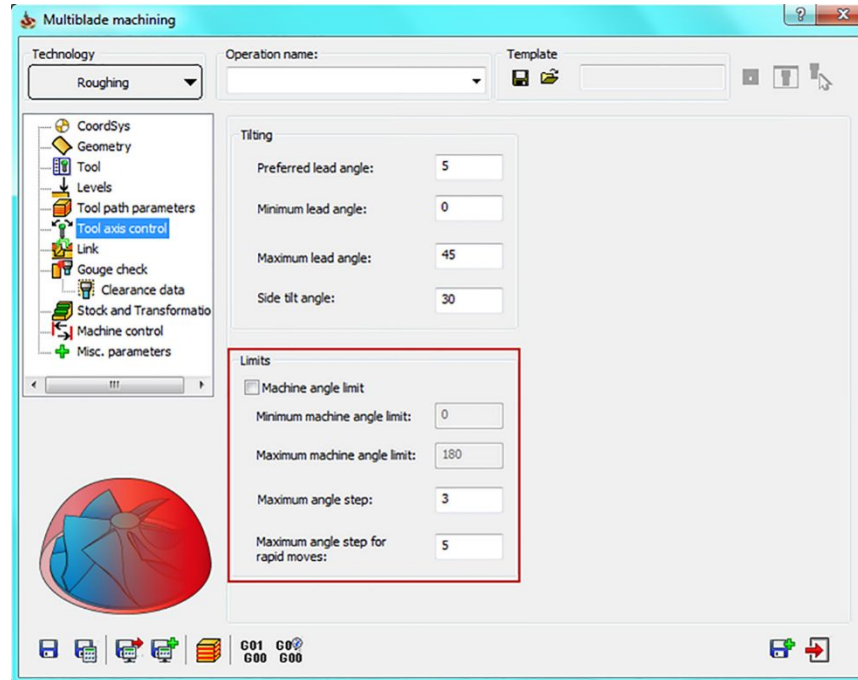
☐ **Tool axis control page: Limits section has enhancements.**

- **Option to use a plunge arc, while performing link between slices or layers, in order to provide gradual entry into the material**

- **Enables you to specify the diameter of the approach & retreat arc, using the ratio of the Arc diameter to the Tool diameter**

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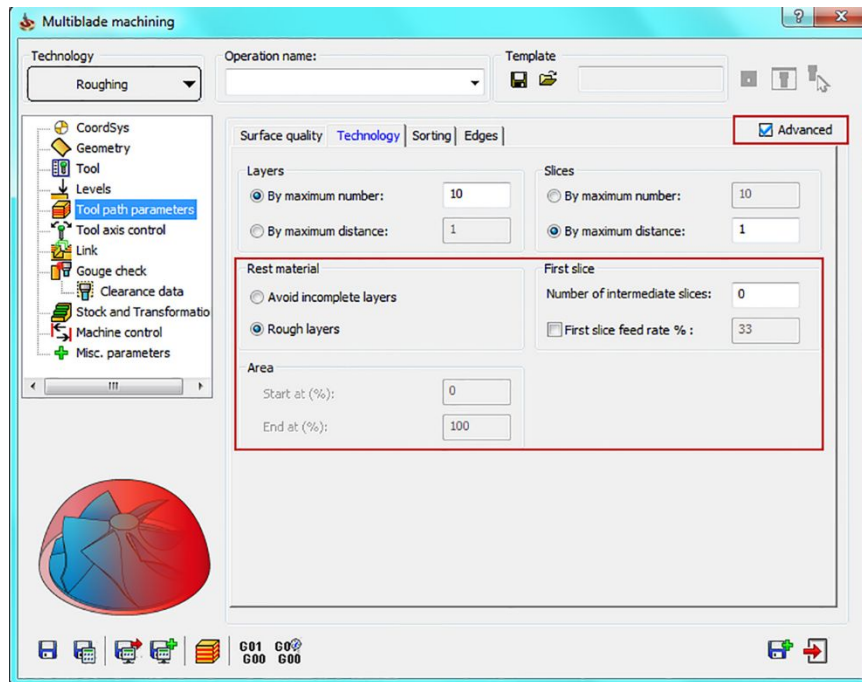
☐ **Tool path parameters page/Technology/ Options of Rest material, First slice, and Area are available only when the Advanced check box is selected.**
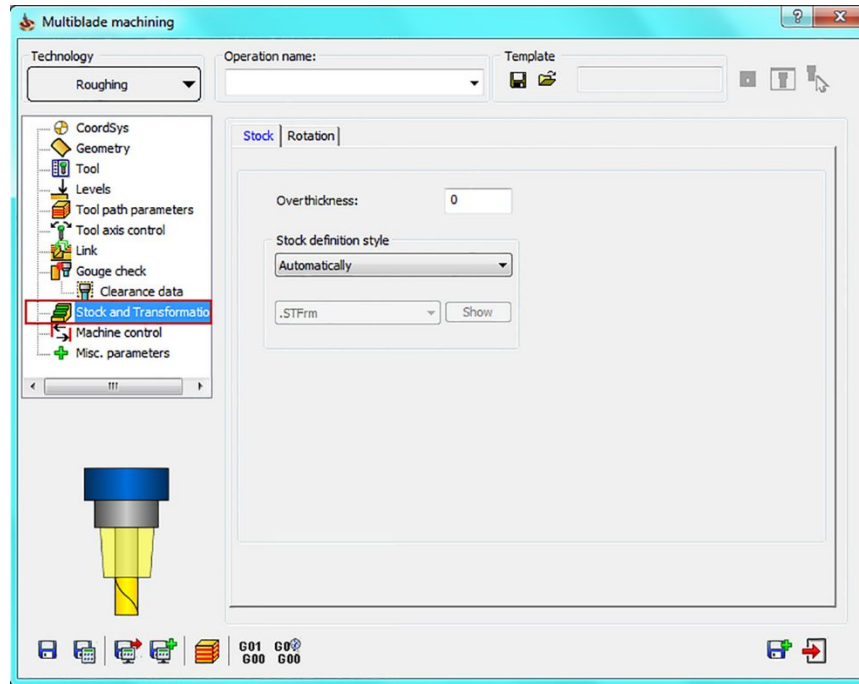
□ **Roughing and More is renamed as Stock and Transformation.**
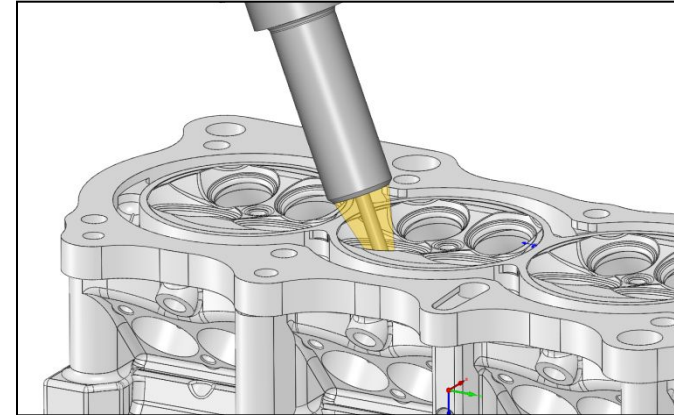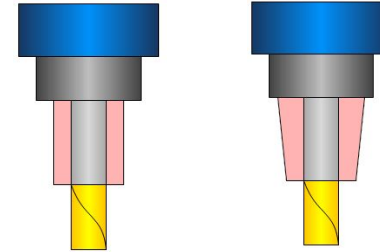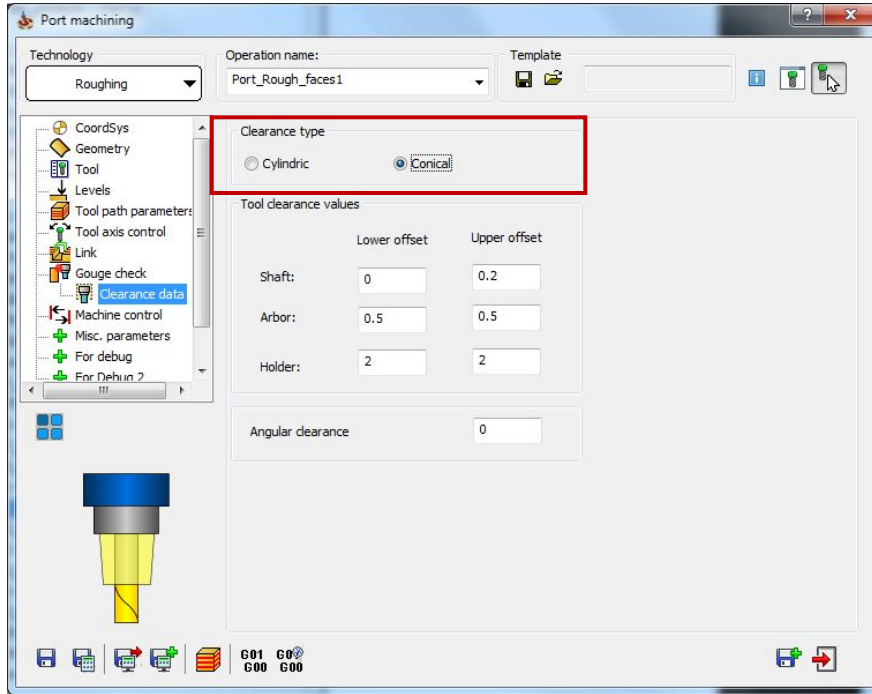
- **A new Tool Clearance type, Conical, is added to enable cutting more material and working deeper, while avoiding gouging**
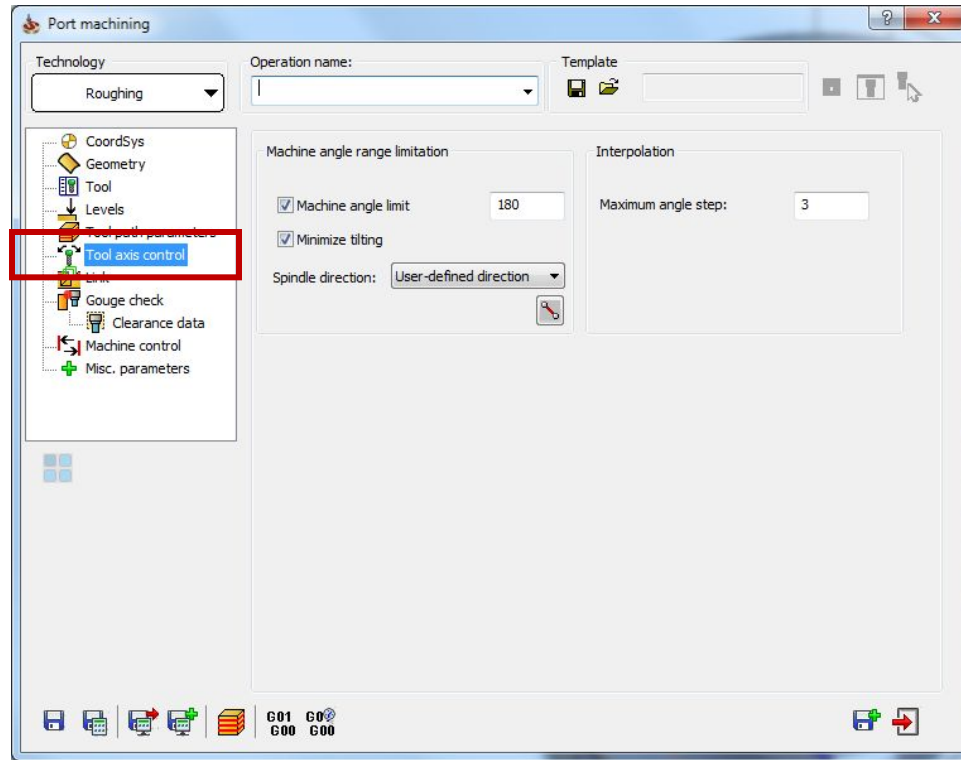
□ **Tool axis control page added in order to provide smoother tool tilting during cutting**

- Tool axis control: <u>**Minimize tilting**</u> is added.

- This option improves tool tilting by minimizing angle changes and keeping machine tilt motions to minimum.
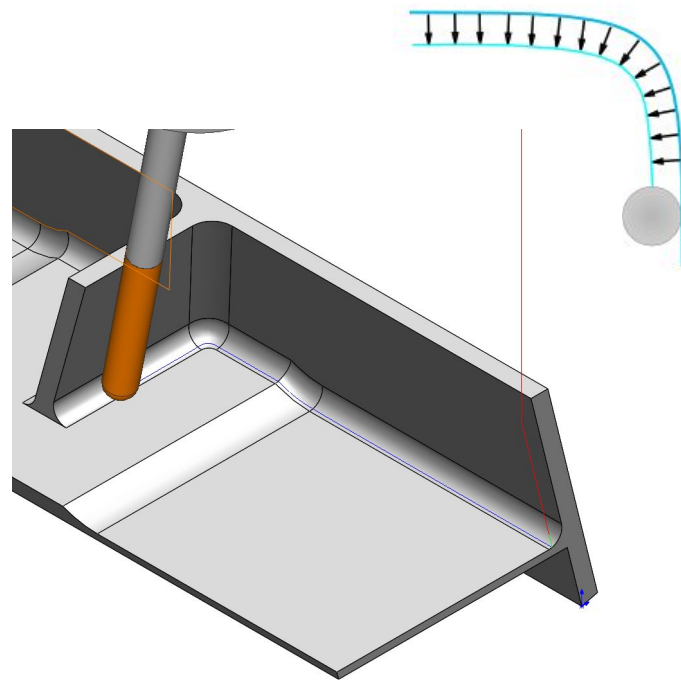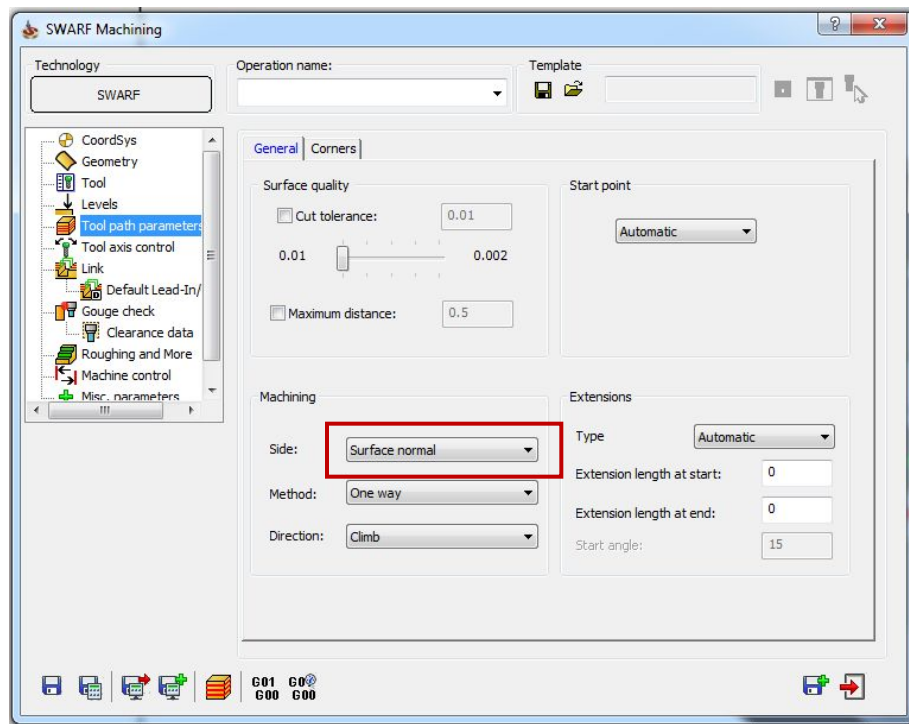
• **Side of machining is determined according to the surface normal, simplifying the determination of the machining side when machining multiple surfaces**

- **New Avoid Gouge strategy, Avoid by Retracting, enables the user to avoid obstacles by retracting the tool**.

- **New simplified layout for gouge page.**
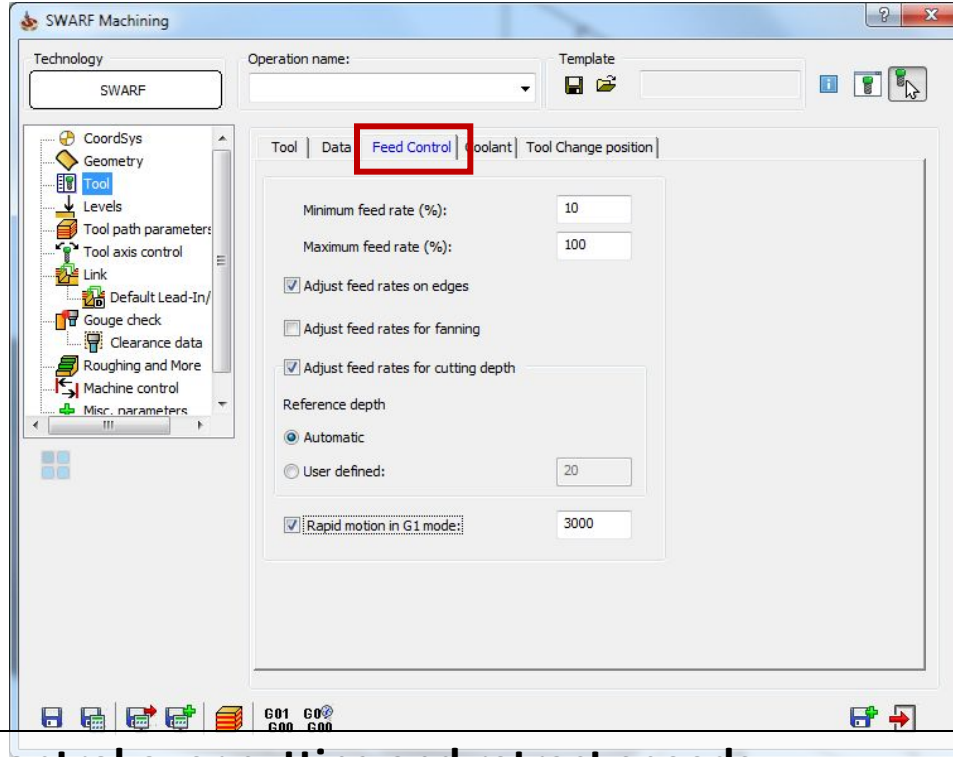
- **More flexible control over cutting and retract speeds**

- **Possibility to replace Rapid movements by G1 moves**
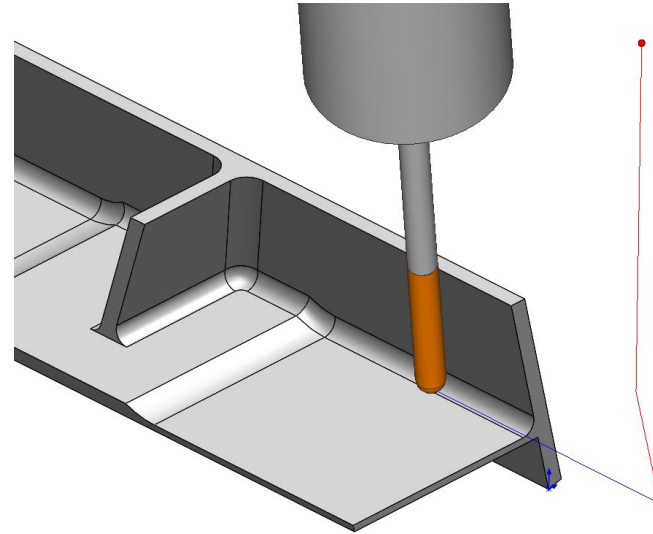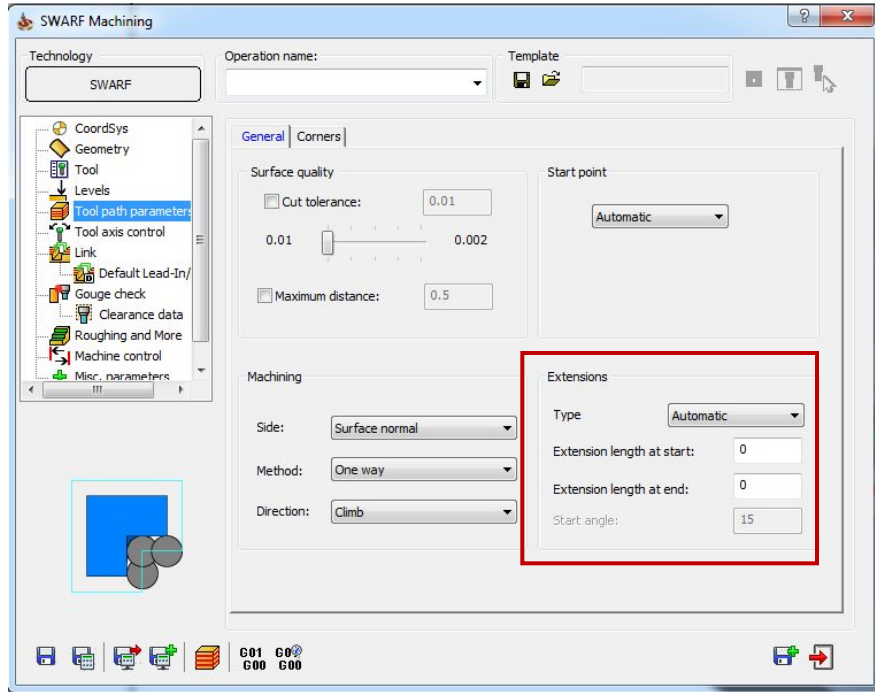
- **New option to add extensions to the tool path, to avoid direct entry into the material, thereby increasing tool life**
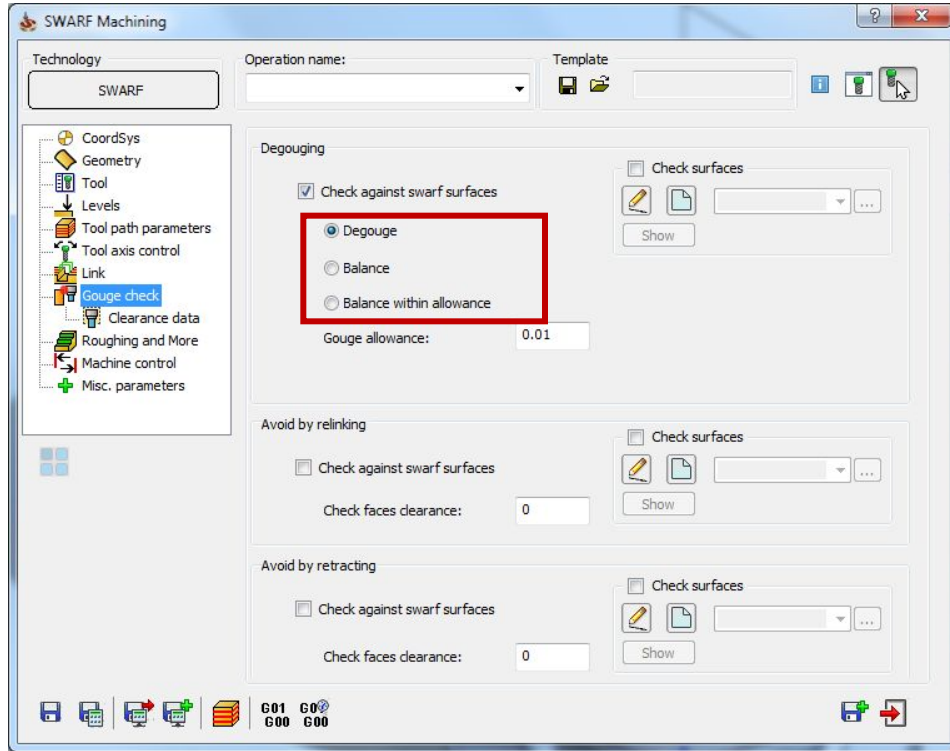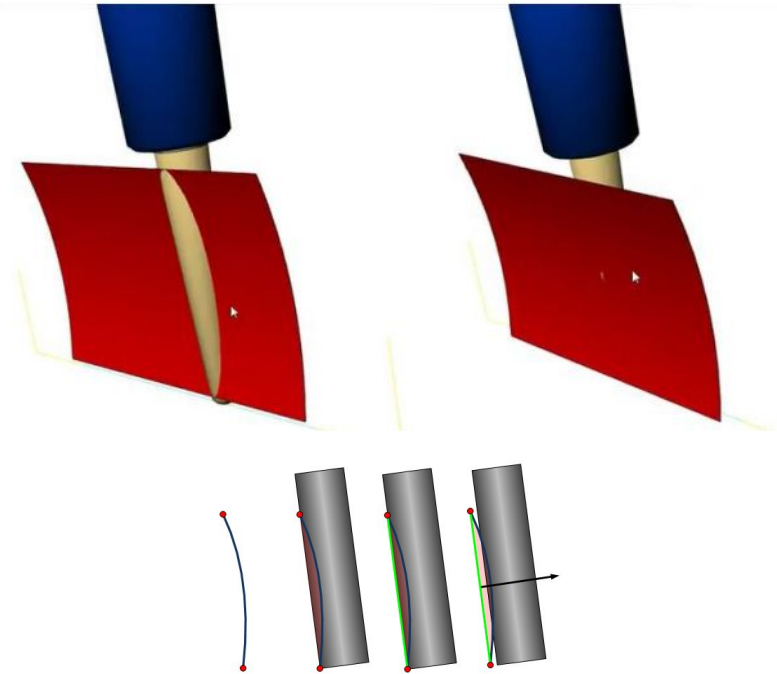
**Degouge option**

• **New options to avoid gouges with drive surface**
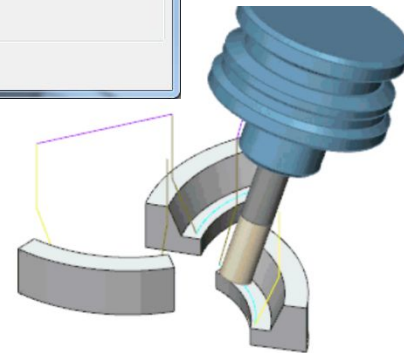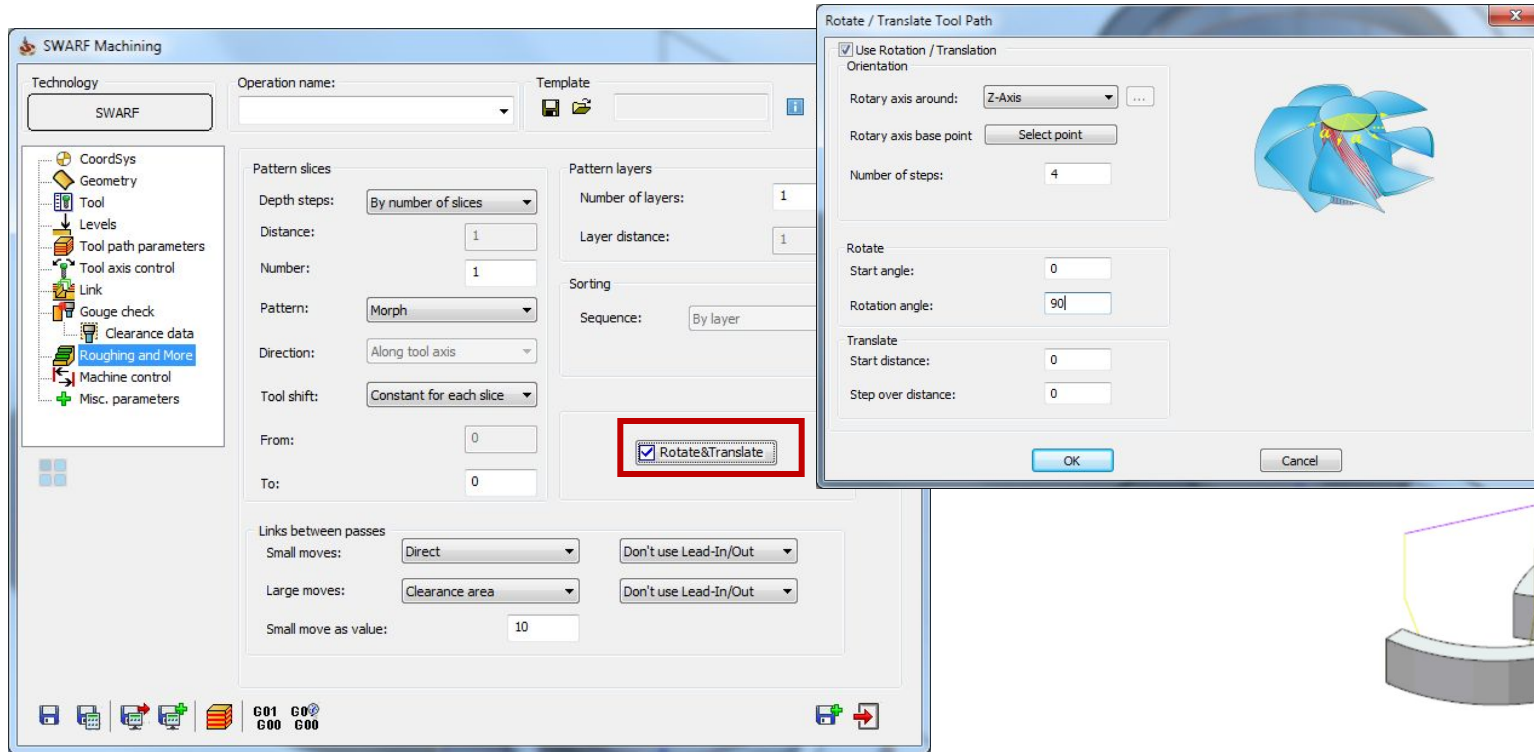
**• Rotate & Translate option is available for SWARF operation also**
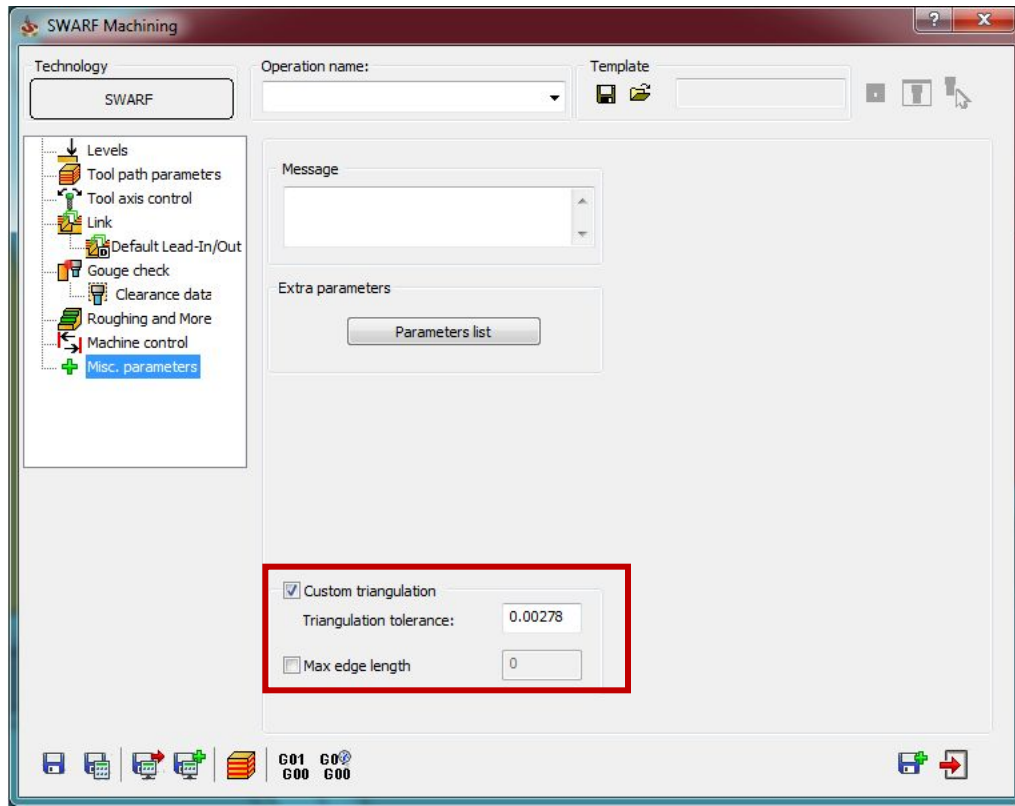
- **Provide more control over surface triangulation**

- **Custom triangulation check box = OFF, SolidCAM uses the native CAD triangulation method.**

- **Custom triangulation check box = ON, 5-Axis triangulation method is used to define the Triangulation tolerance and Max. edge length.**

• **Avoid collisions by preventing sudden tool „jumps"**

- **The Multiaxis Drilling Technology page has a new option: <u>Use cycle.</u>**

- **When this check box is ON, the generated G-code uses canned drill cycles, if CNC machine enables it.**

- **If this check box is OFF, the output is in the form of linear movements.**
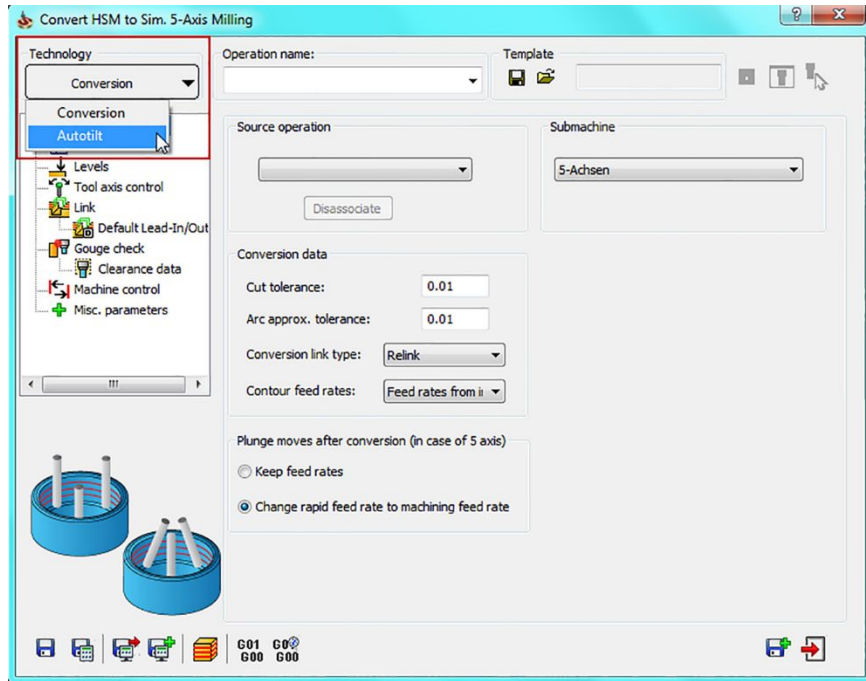
- **New Technology of <u>Autotilt</u> is added.**

- **This option enables the conversion of a 3-axis input tool path into a full automatic collision-checked 5-axis tool path.**

- **The main aim is to take the 3-axis tool path and use it with a much shorter tool.**

- **The automatic tilting now does compensate the holder with the geometry and tilts it away.**
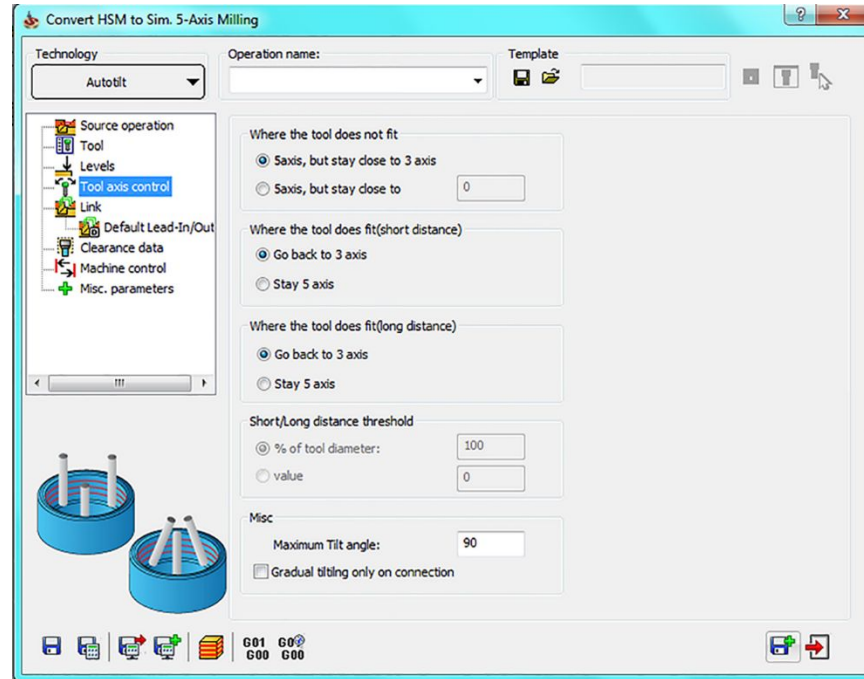
☐ **Tool axis control page has new options when Autotilt is selected as Technology.**
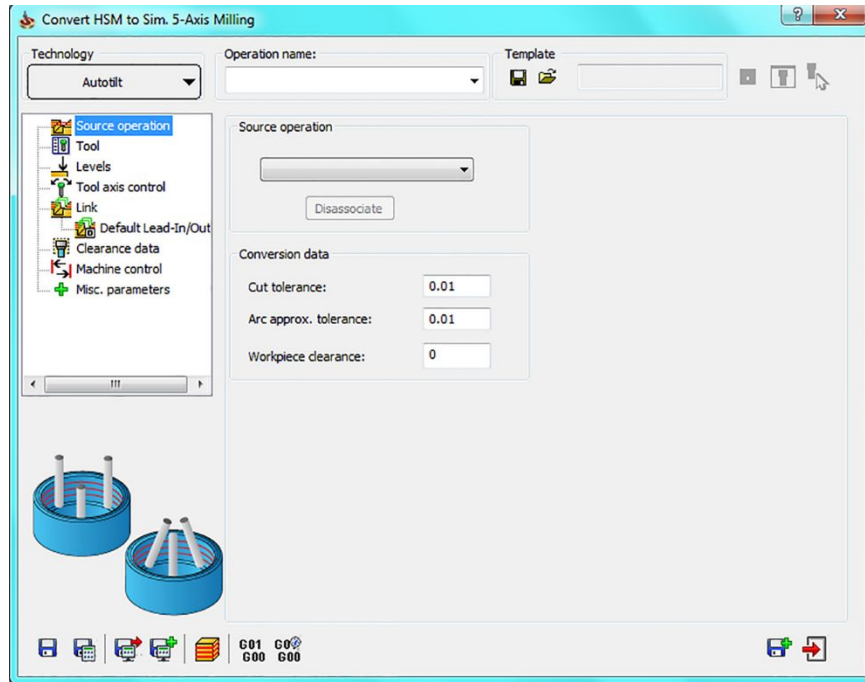
- Source operation page has the new option of <u>Workpiece clearance</u>.

- The Workpiece clearance option enables you to set a value by which the tool clears the workpiece when moving between two positions.

- <u>Note</u>: This option is available only with the Autotilt technology.

- **Stock definition: New option of <u>Trim only full contours</u> is added.**

- **Enables you to keep the cuts that are partially within the stock and remove the cuts which are completely outside the stock - enabling much smoother cuts and less jumps.**
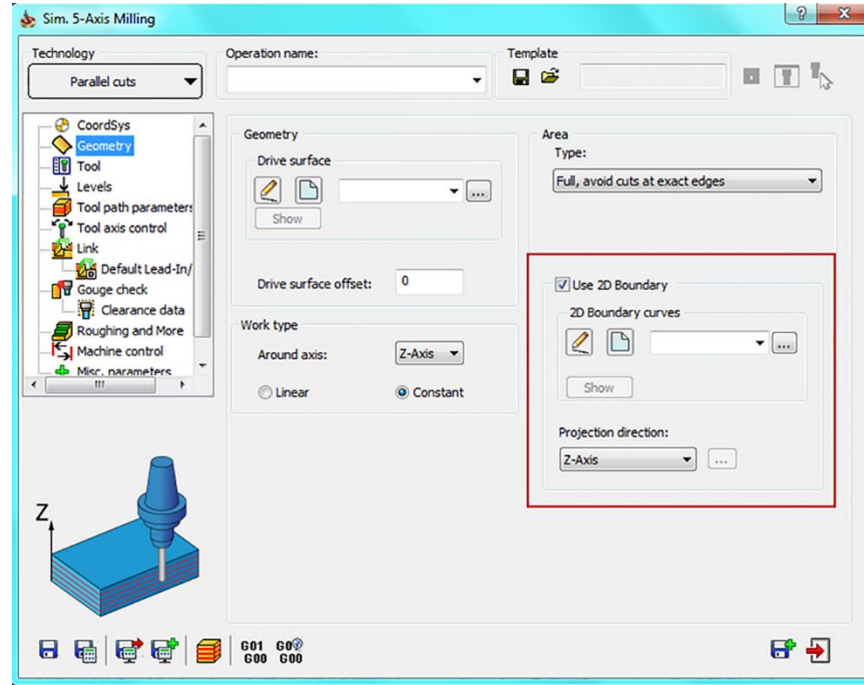
☐ **2D Boundary curves content is placed inside Geometry page.**
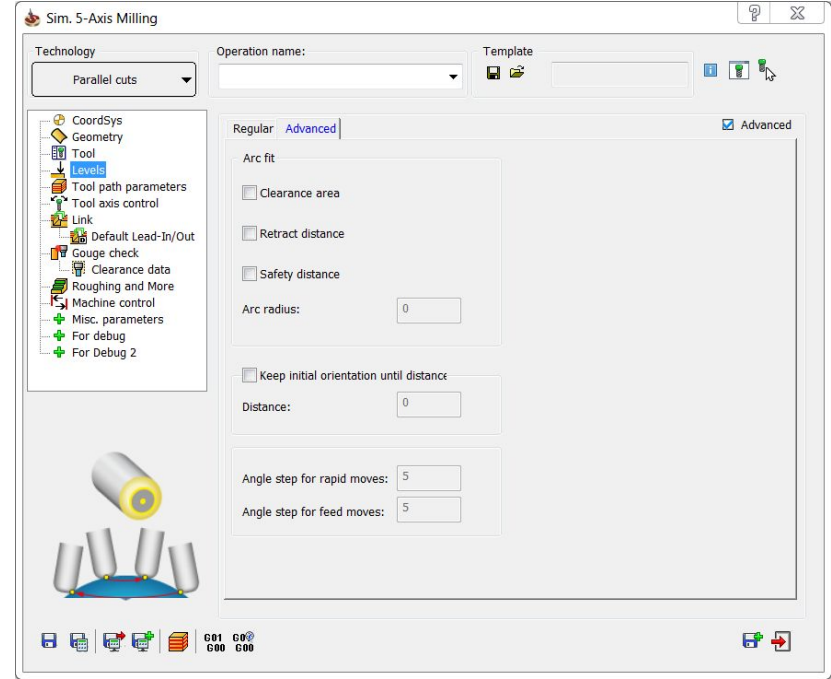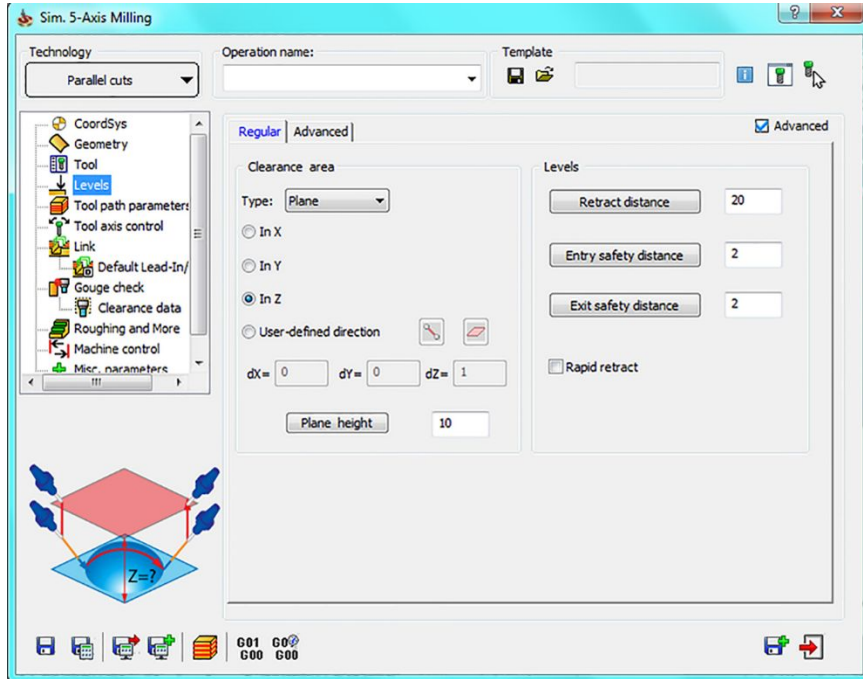
□ **Parameters divided into two tabs: Regular (most used) and Advanced.**
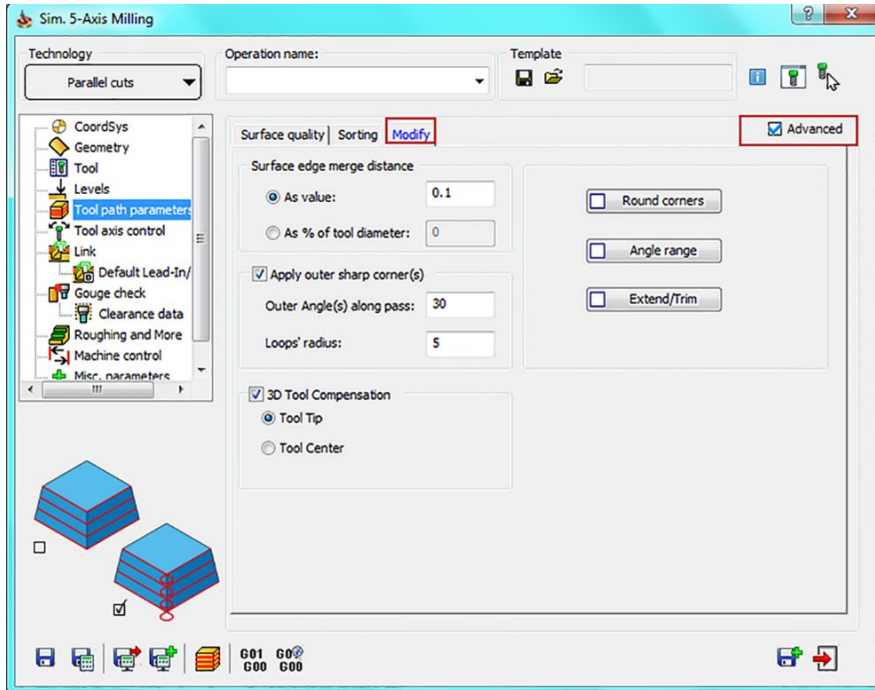
- **New Modify tab is added.**

- **Round corners, Extend/Trim, and Angle range moved to this page from Geometry page since they are related to toolpath.**

- **Modify tab is available only when the Advanced check box is ON.**

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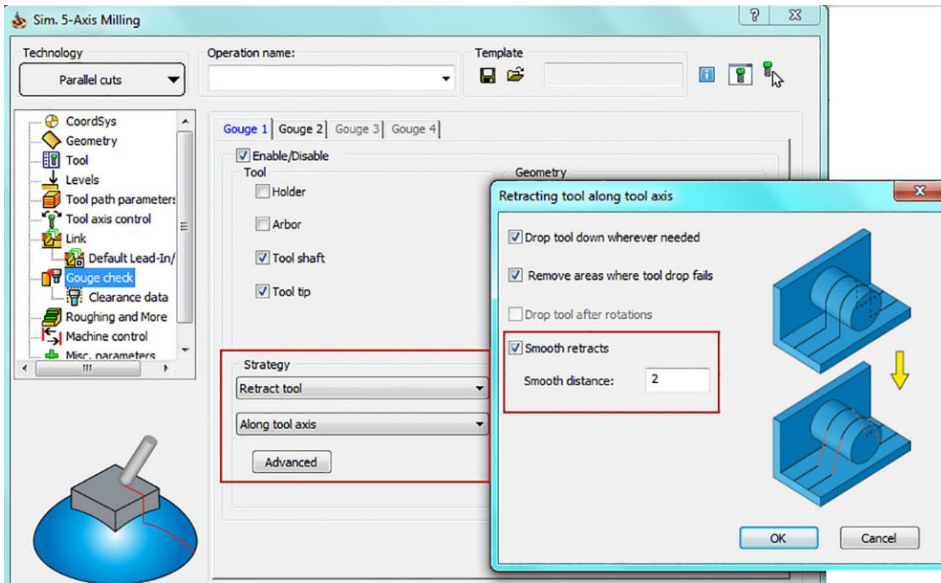
- **Strategy: Retract along tool axis/ Advanced: New option of <u>Smooth retracts</u> is added.**

- **The Smooth retracts check box enables you to smooth the transition from the collision free area to the tool retraction area by avoiding sudden axis jumps.**

- **The Smooth distance field determines the start distance of the smoothing to the collision area.**
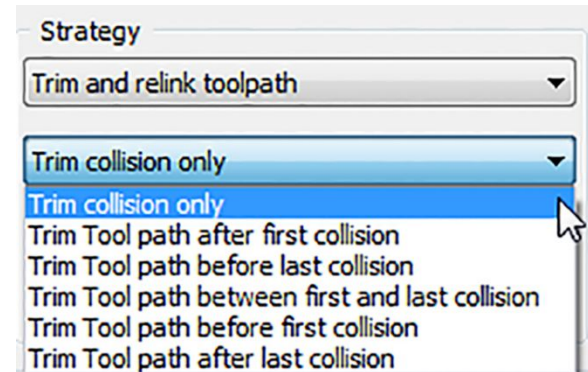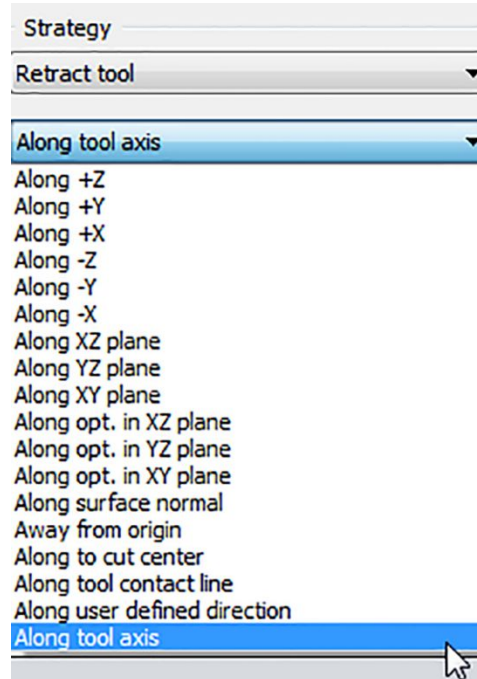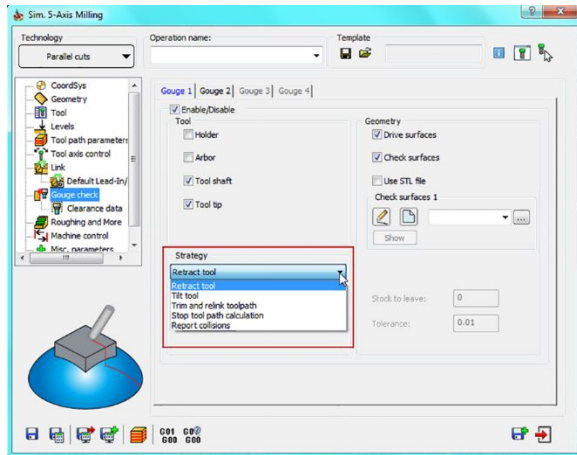
**The Gouge check strategies are logically named**
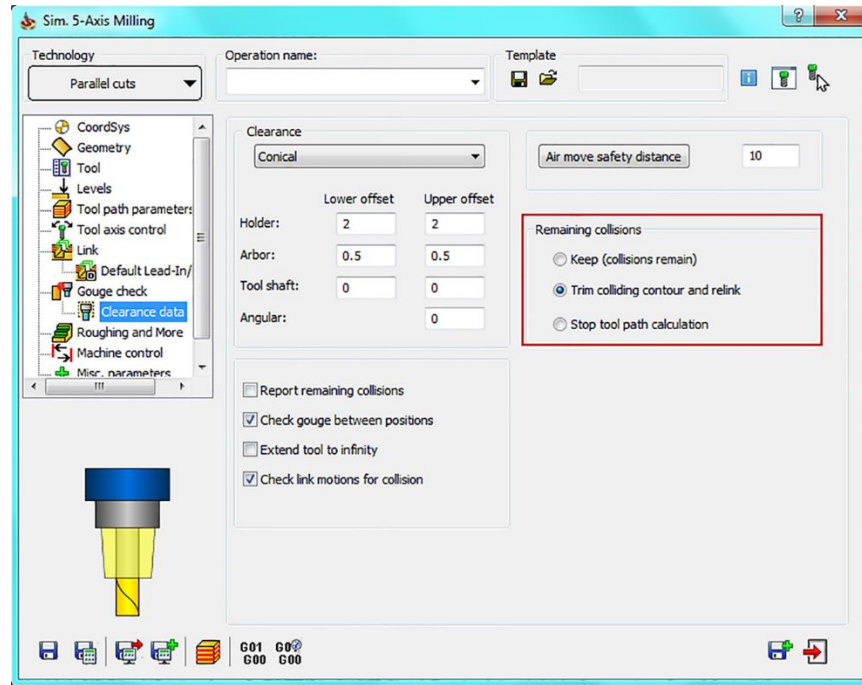
☐ **Remaining collisions section is updated – one option removed.**

# Turning
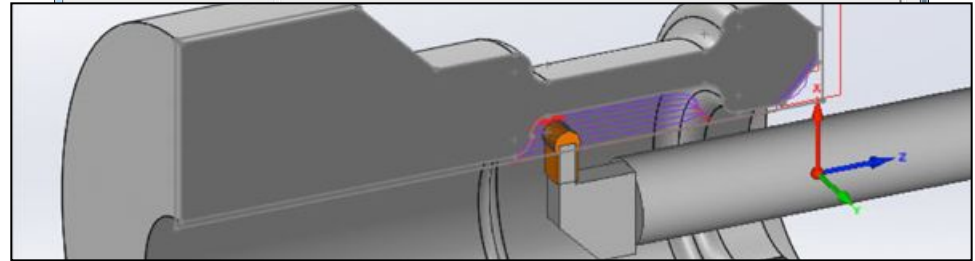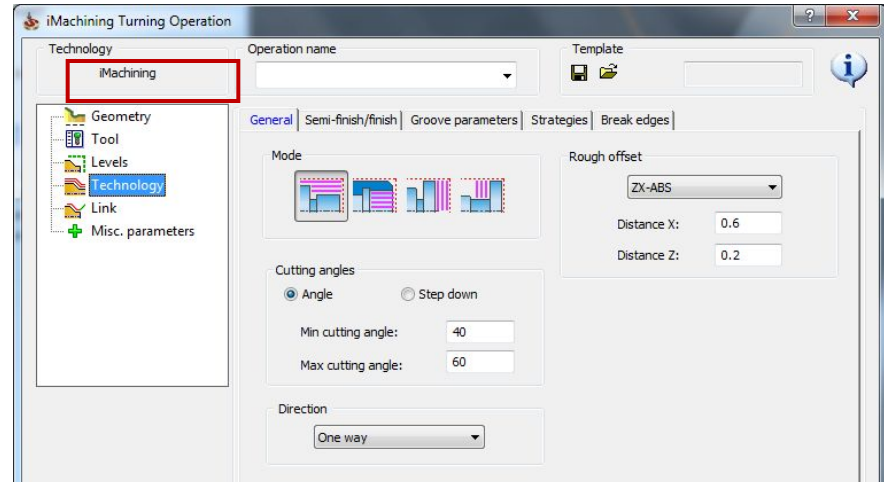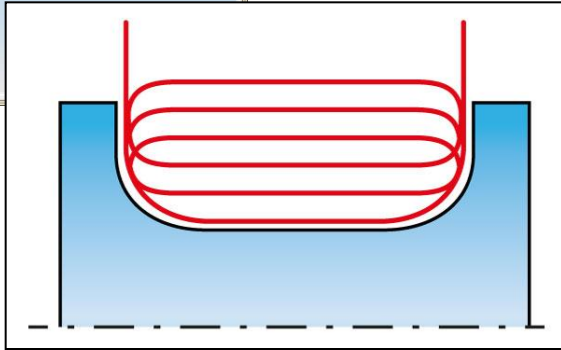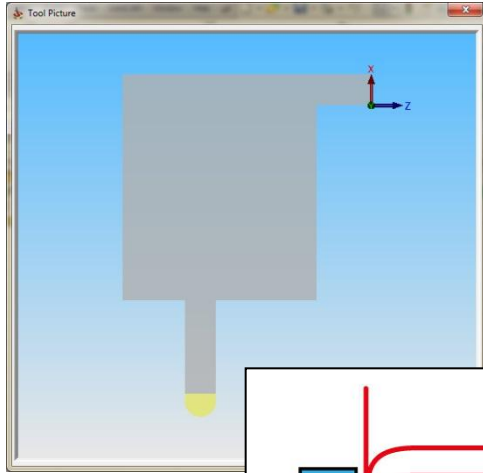
• **iMachining-style torochoidal moves of round grooving tool in turning**

- **Possibility to use Milling tools in Turning Drilling operation**

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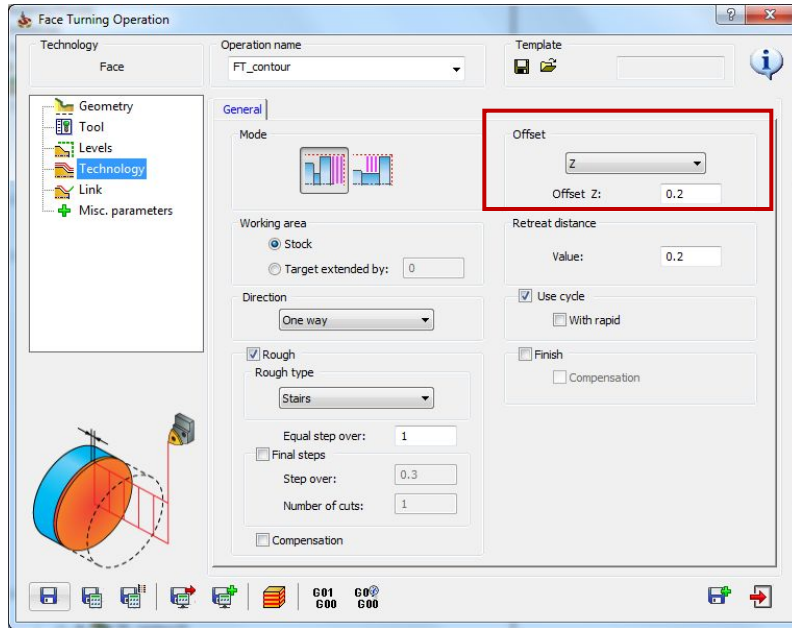
@turning   ==> work_type:rough semi_finish:false finish:false
..> label:5002 start_line:10 end_line:12
..> process_type:face turning_mode:external
..> is_line:false num_points:0
..> rough_offset_x:0.000 rough_offset_z:0.200
..> semi_offset_x:0.000 semi_offset_z:0.000
..> first_pos_x:26.600 first_pos_z:0.000
..> last_pos_x:5.600 last_pos_z:0.000
..> down_step:1.000 safety:2.000
..> retreat_distance:0.200

- **Output offset value in Face turning cycle**
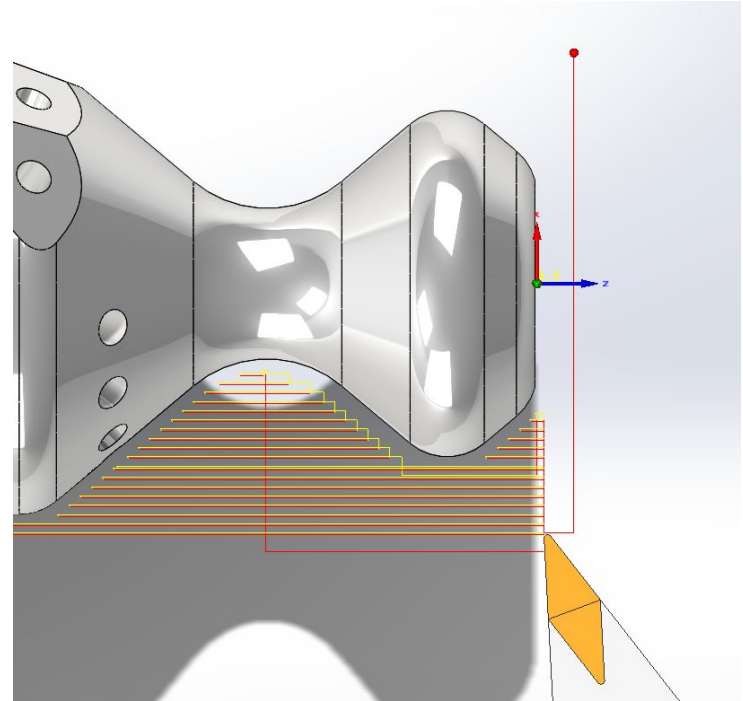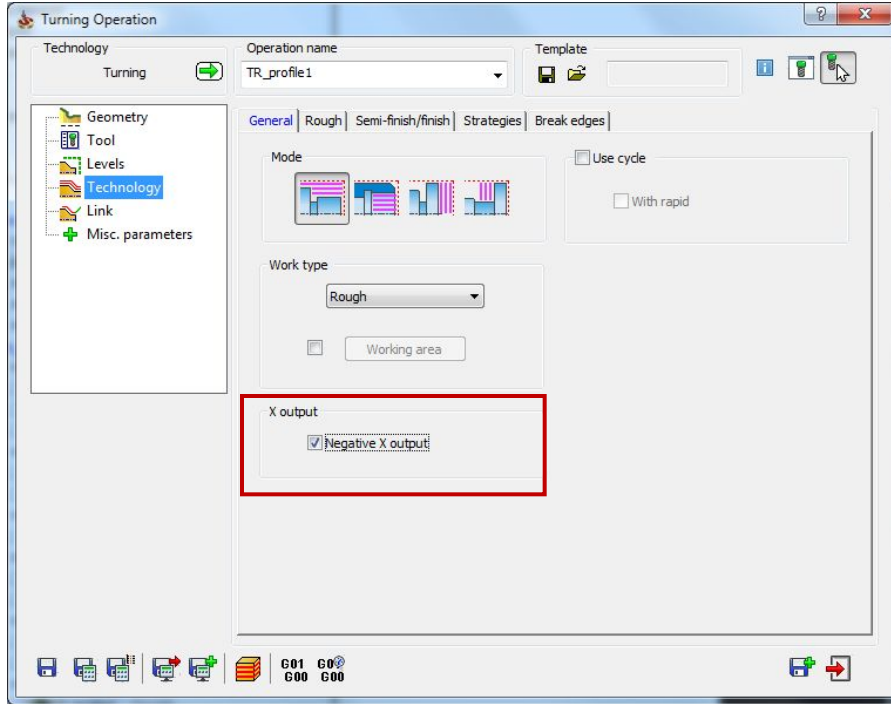
• **Possibility to get (-X) cutting toolpath with start/end points in (+X)**

**• Option to avoid penetration to slots on face surfaces also**

# Turning: Auto Lead in/out cancelled
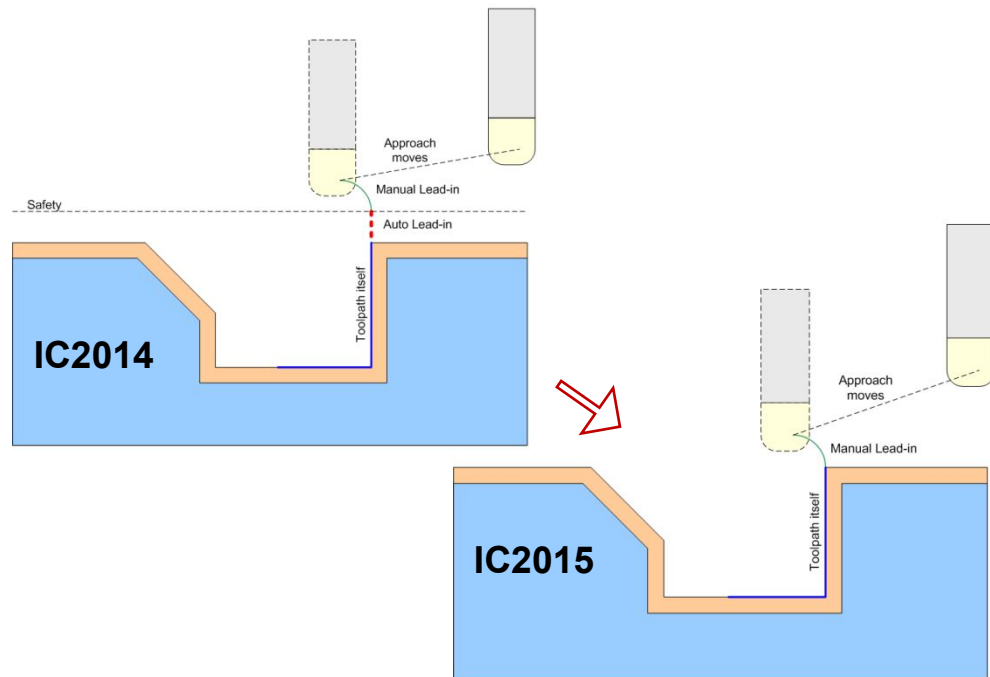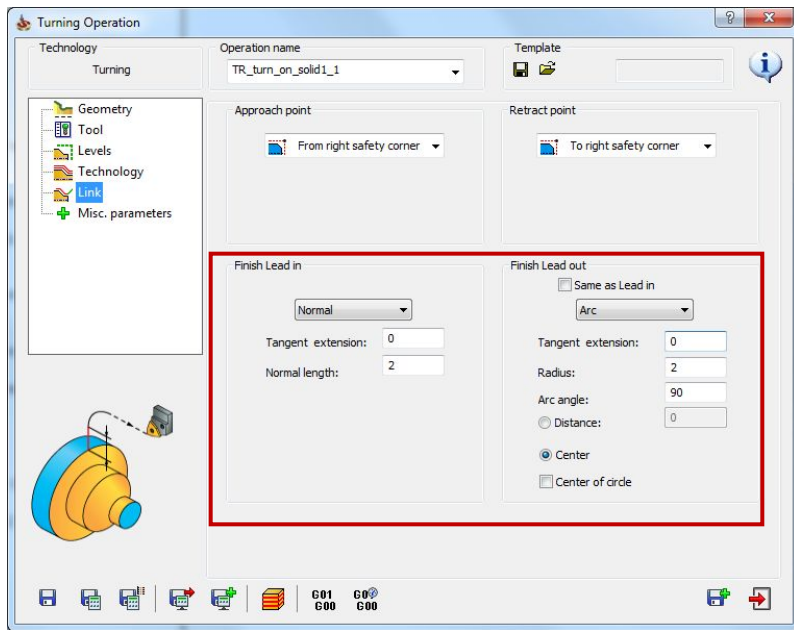


- **In previous versions, an additional movement before Lead in/out was added automatically. In this version they are not added; user defines lead-in and lead-out**
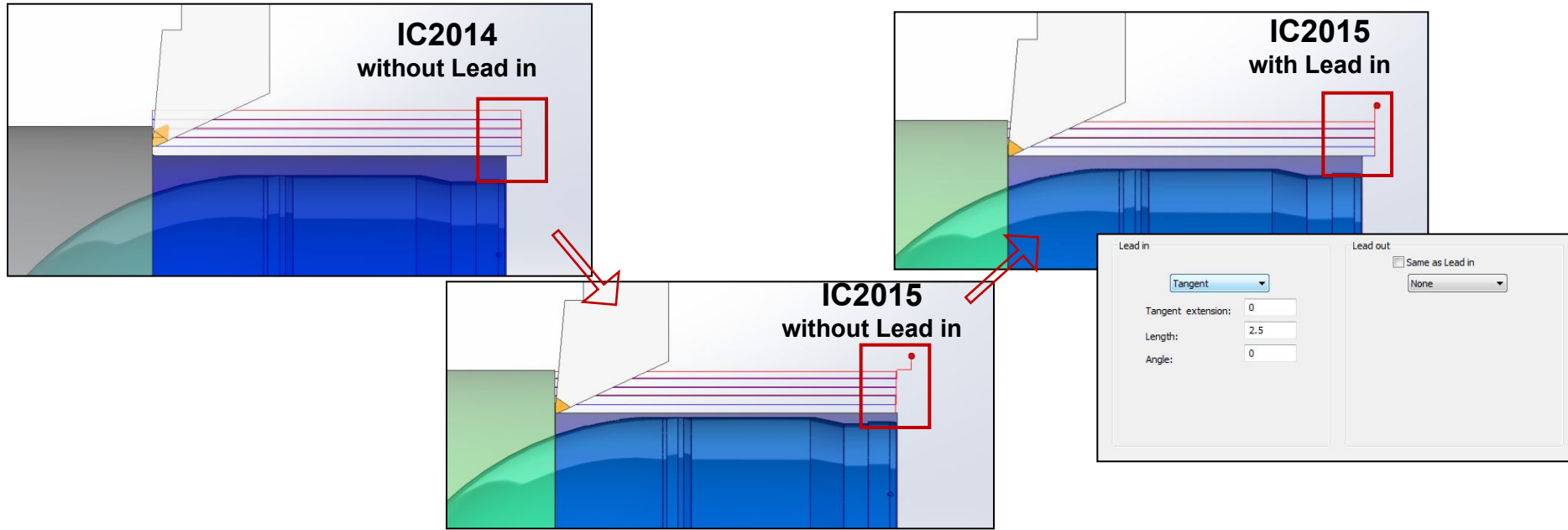
- **In previous versions, we had only an automatic lead in/out for roughing**
- **Now the automatic lead in/out is cancelled and manual lead in/out, if defined,will be applied to Rough toolpath also**

• **Split long lines of turning toolpath to short lines, according to the distance defined**

# Mill-Turn

Z- Blue, X- Red

- **World CoordSys is always with Z vertically UP**
- **Machine orientation (vertical, horizontal) is defined in World CoordSys**
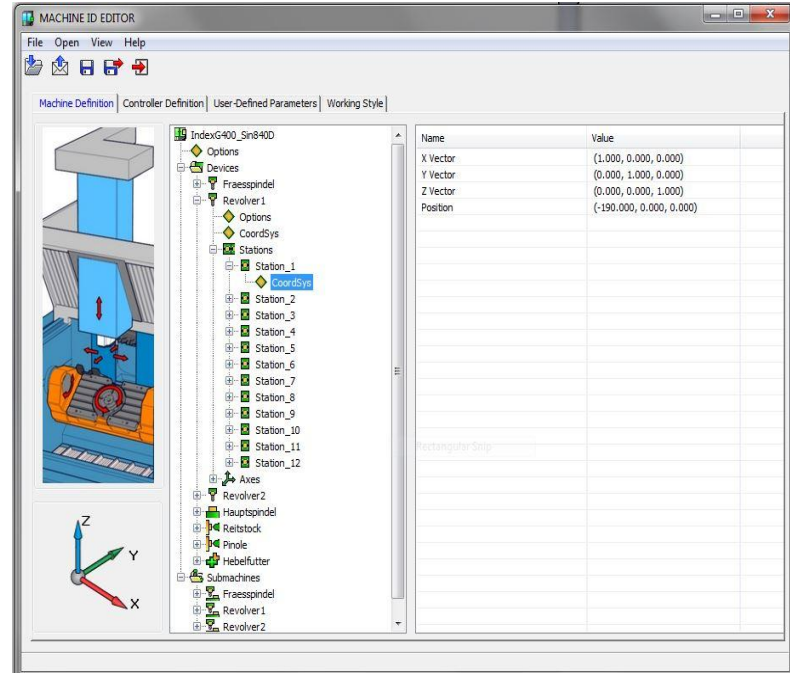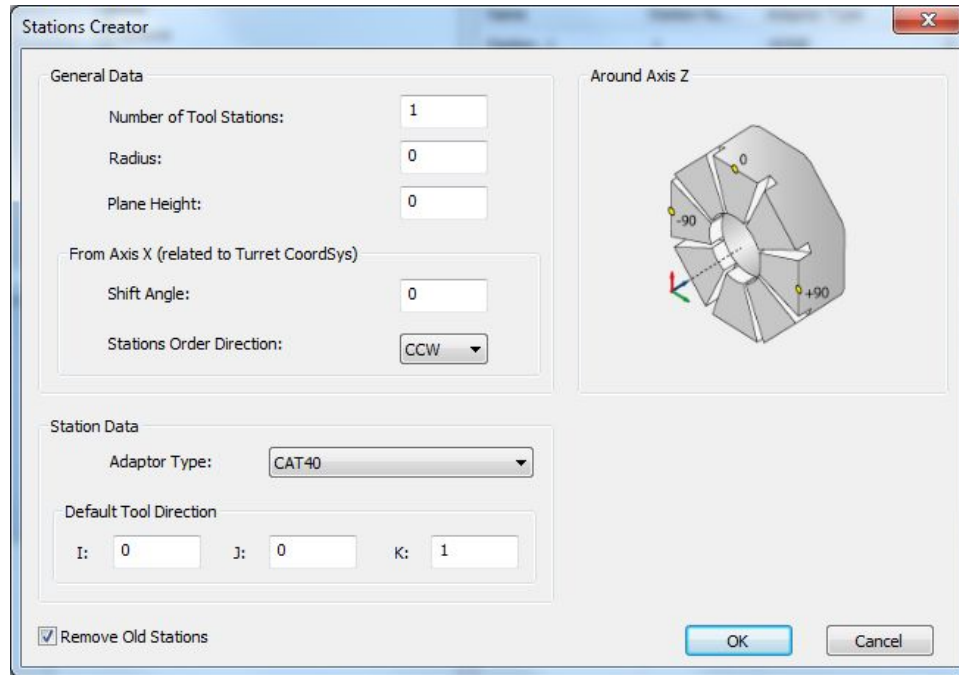
• **Easy way to create multiple stations in VMID**

• **Automatic calculation of changed MCO's related operations**

• **Possibility to move the CAM-part from Table to Table by turret or any other device**

- **New tool mounting interface – based on station and device CoordSys**
- **Shown as it actually looks in CNC Machine**
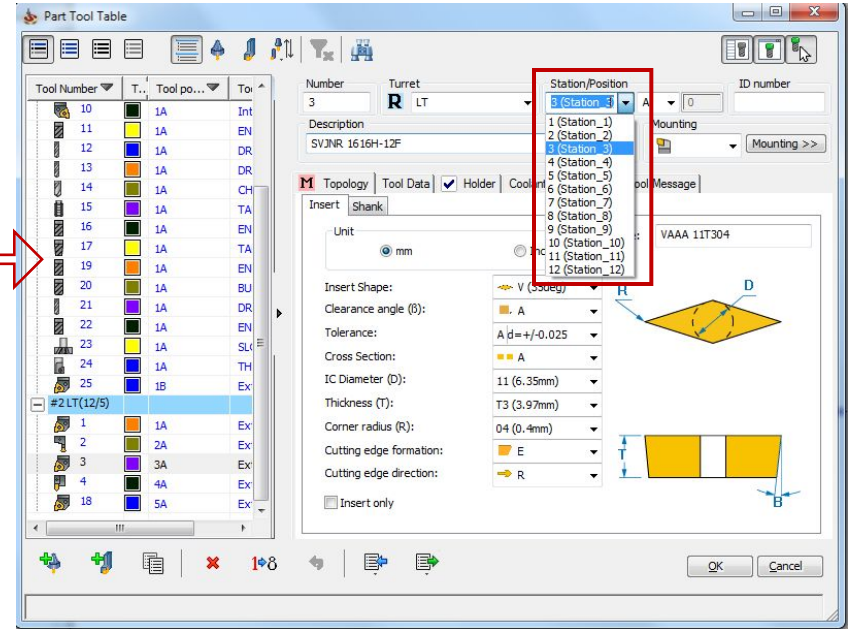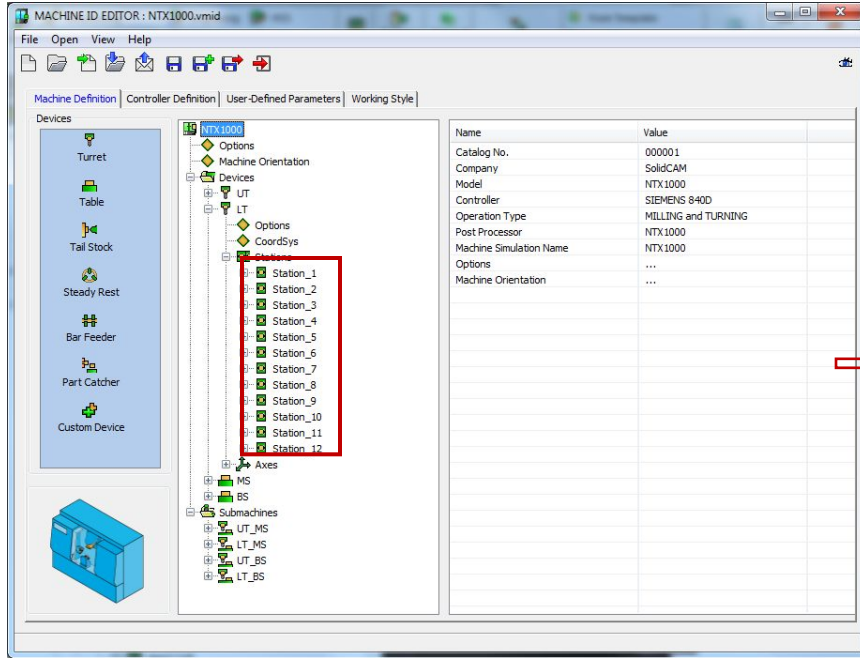
- **Show station name in the List of stations in Tooltable**
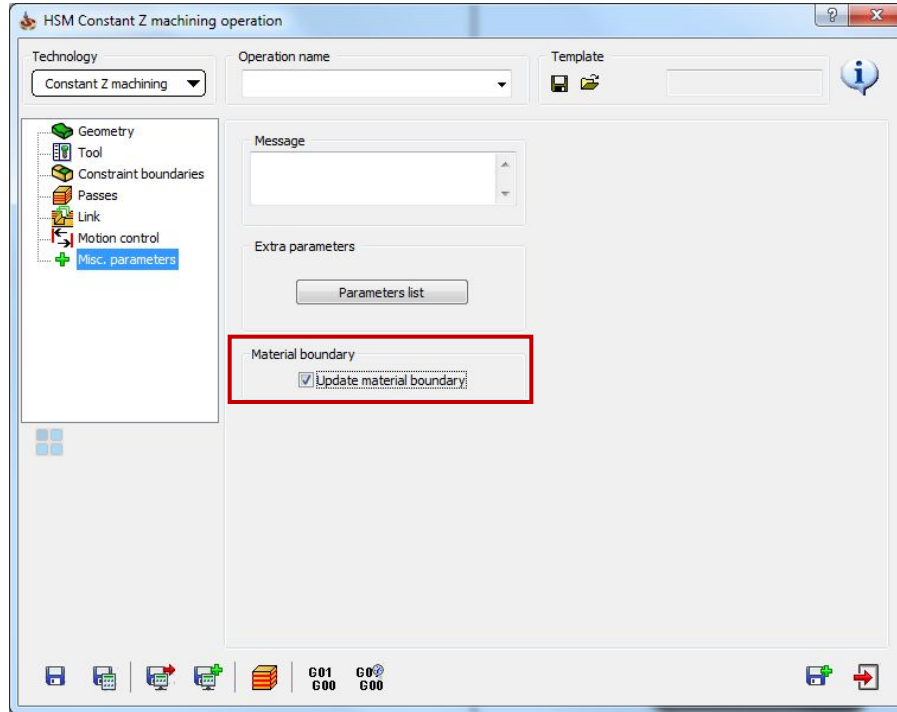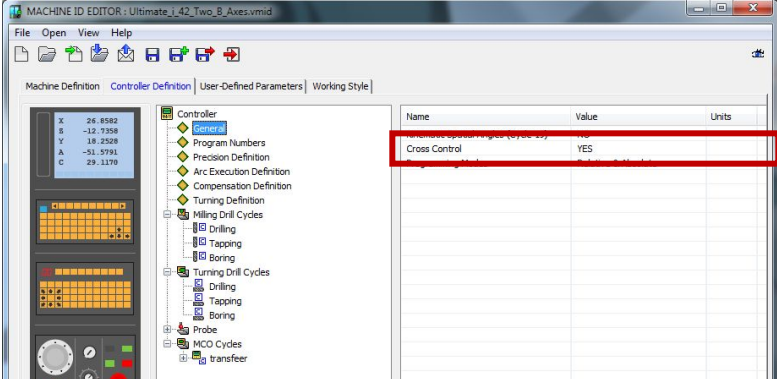
- **Take into account HSR/HSM operations when updating stock for further turning operations**

# Definition of Cross Control
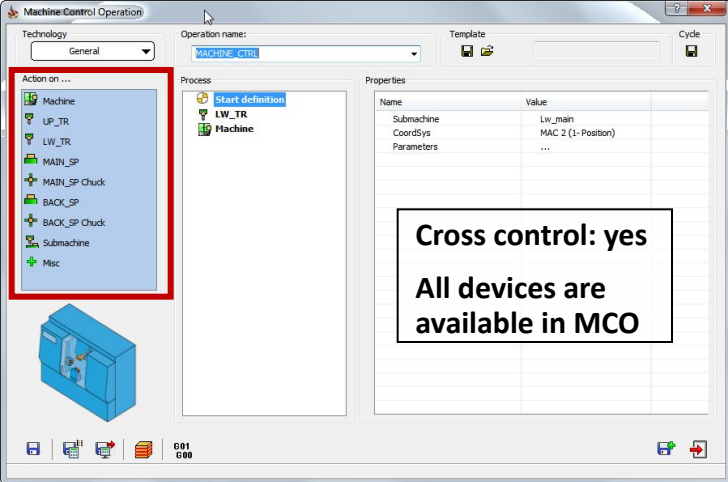


- **By default – cross control is always turned on**

- **\*.VMID allows to cancel Cross Control (access to devices from opposite channel), if it is not supported by the machine.**
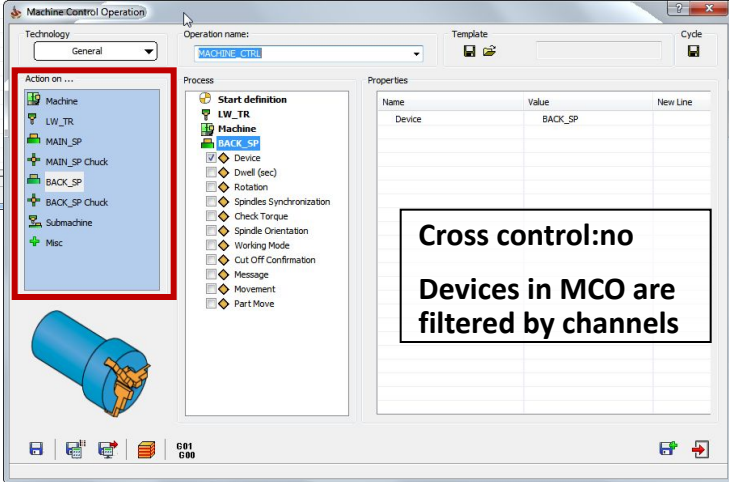
**Cross control: yes**

**All devices are available in MCO**

**Cross control: no**

**Devices in MCO are filtered by channels**

# Channels definition in VMID
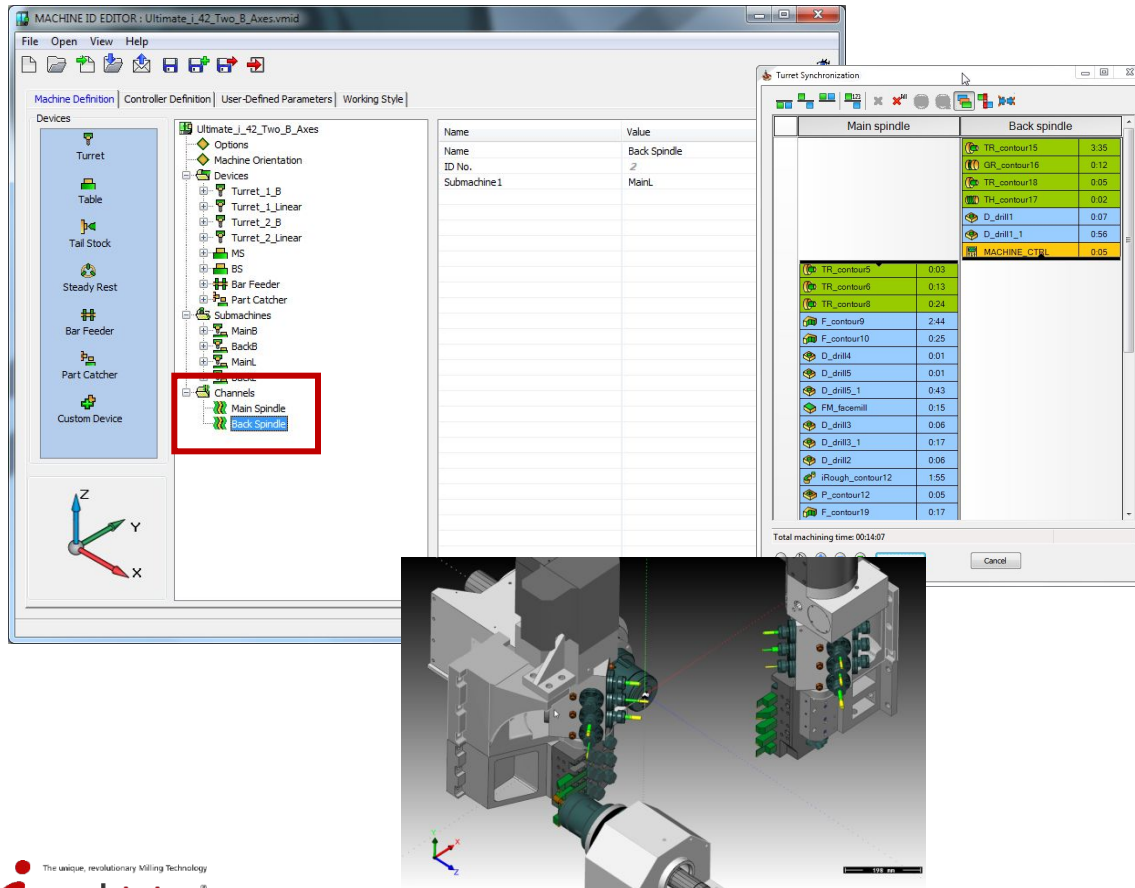


- **Custom channels definition**

- **Definition of channels by sub-machines, not turrets**

- **Enables synchronisation process between tables (Swiss Type lathes)**

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- **Opposite spindle**
- **Rotary turret**
- **Simultaneous 5 axes**
- **Balanced turning**
- **Part transfer**
- **Additional devices**

- **Opposite spindle**
- **Rotary turret with milling functionality**
- **Simultaneous 5 axes**
- **Balanced turning**
- **Part transfer**
- **Additional devices**

- **Opposite spindle**
- **Rotary turret as B-axis**
- **Linear turrets**
- **Simultaneous 5 axes**
- **Synchronization**
- **Part transfer**
- **Combined turrets**
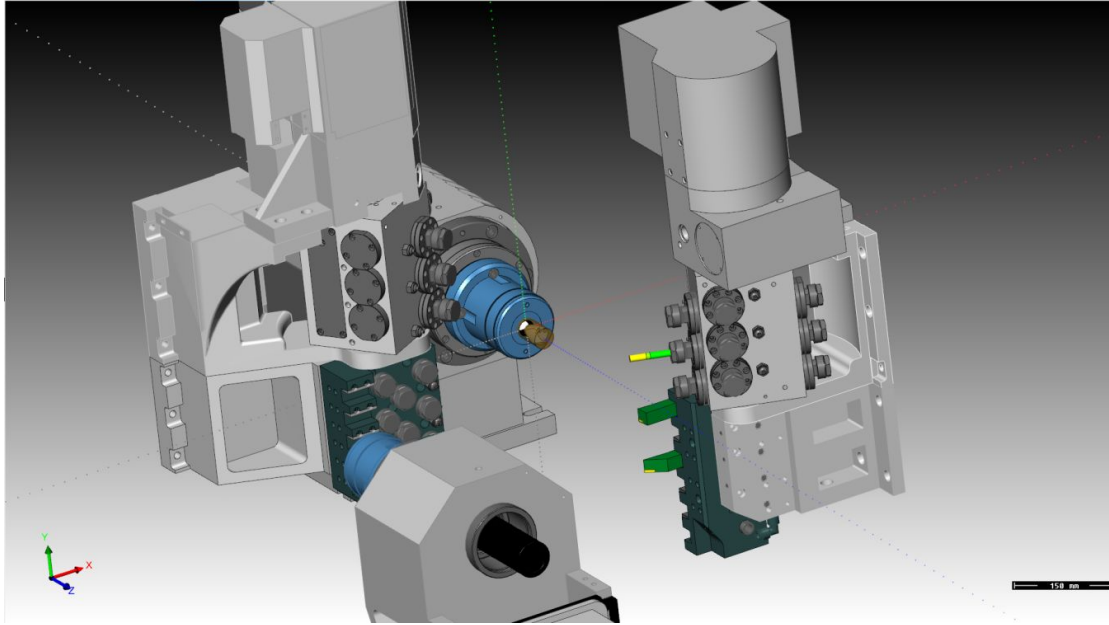
## Quicktech Ultimate I42
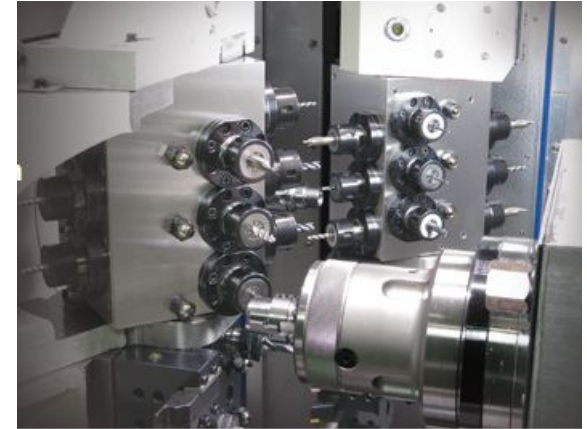


- **Two spindles, Each turret is a combined turret (Rotary type and Linear type)**
- **Channel synchronization by tables**
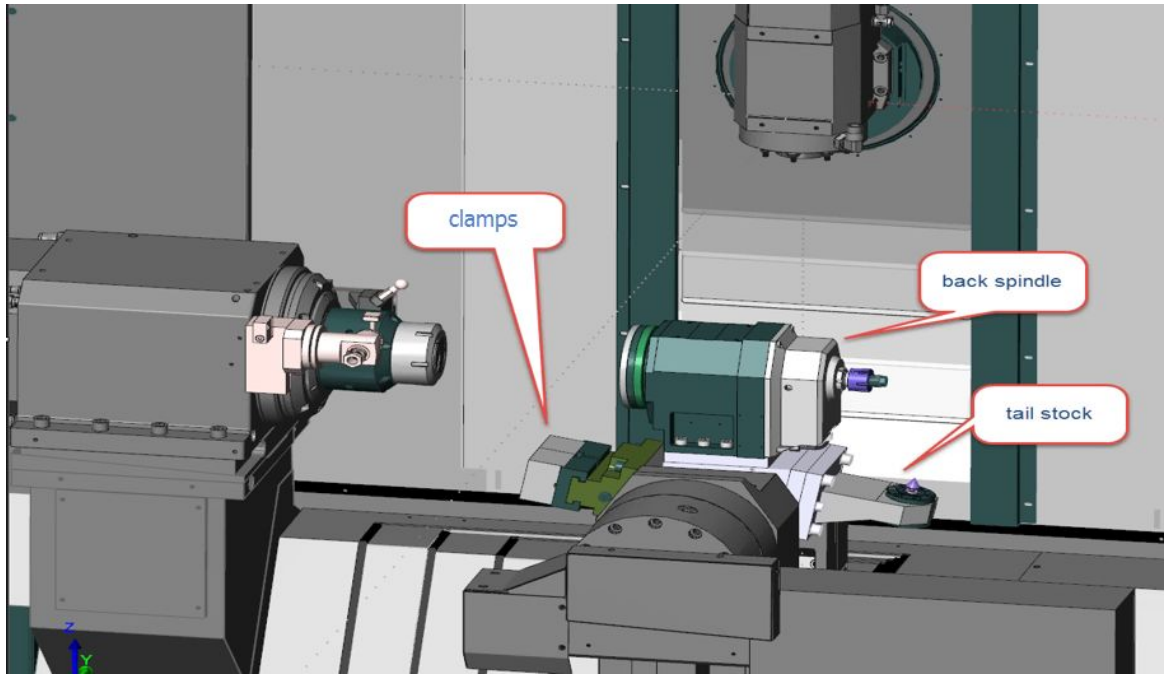
Willemin 508 MT

Cutting Video 1

Cutting Video2



- **Willemin-style: Two spindles, B-axis, Additional devices (Clamps and tail Stock)**
- **Additional devices support by MCO, with full machine simulation**
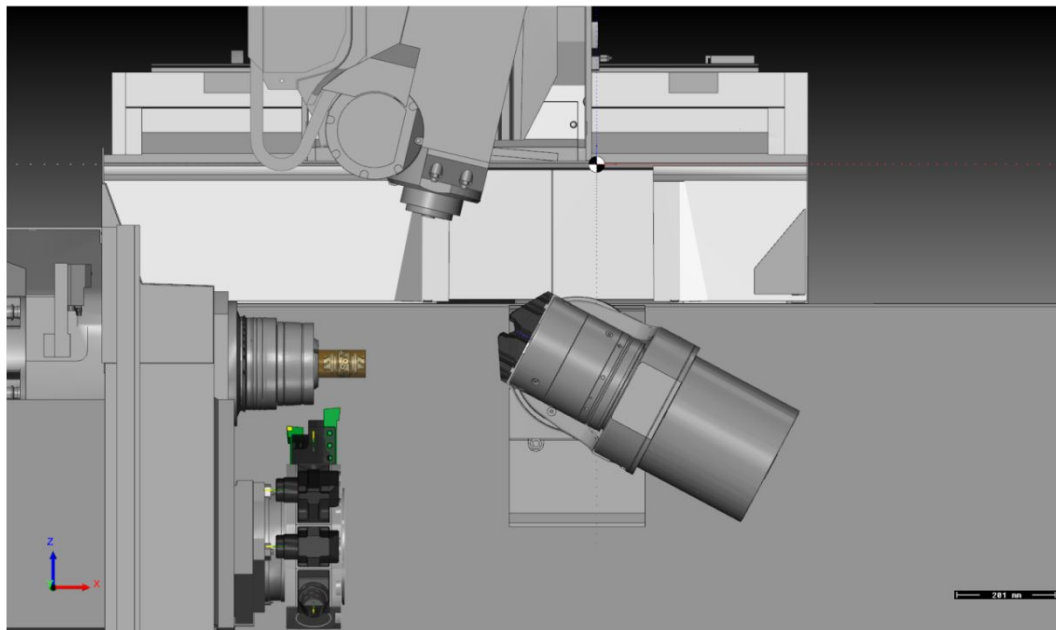
## Chiron FZ 12 MT

- **Chiron-style: Main spindle, Rotary Turret, B-axis, Tilting of back spindle**

- **Full support of MCO operations with full machine simulation**

- **Working with Synchronization (Multi-Channel)**
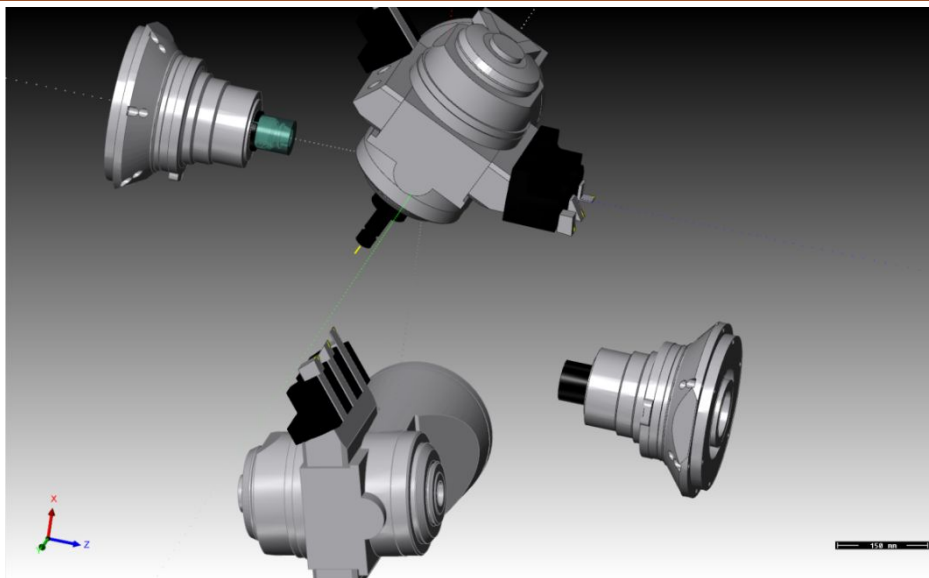
## Index R200



- **Index-style: Two spindles, Each turret is a combined turret (B-axis type and Linear type)**

- **Full support of MCO operations, with full machine simulation**

- **Programming by Channels (not by Turrets)**

# Simulation

- **Show STL holders in simulation and in gouge checking**

- **Show current CoordSys in SolidVerify simulation**
- **Useful for Shop Floor Editor, where SolidCAM runs standalone.**

# Tool Libraries integrations

# Tool Libraries

Iscar

Carmex
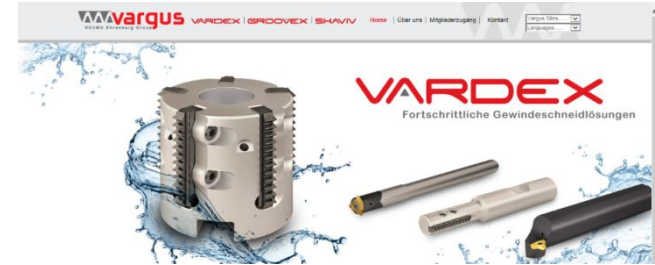
Vardex

- **Online / Offline Databases from Tool Manufacturer**

- **Offering 2D/3D CAD Models with exact Tool Dimensions**

- **.. and recommended Cutting Conditions for their Tools**

- **Online Catalog with assistance to guide users to the best ISCAR Tools**

http://www.iscar.com/ita/MainPage.aspx

- **At the Import Option of the Tool Table, select ISCAR Tool Advisor to launch it**

www.inventorcam.com

http://www.carmex.com

• **Carmex is specialized in the Production of Threading Tools for Turning and Milling**
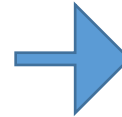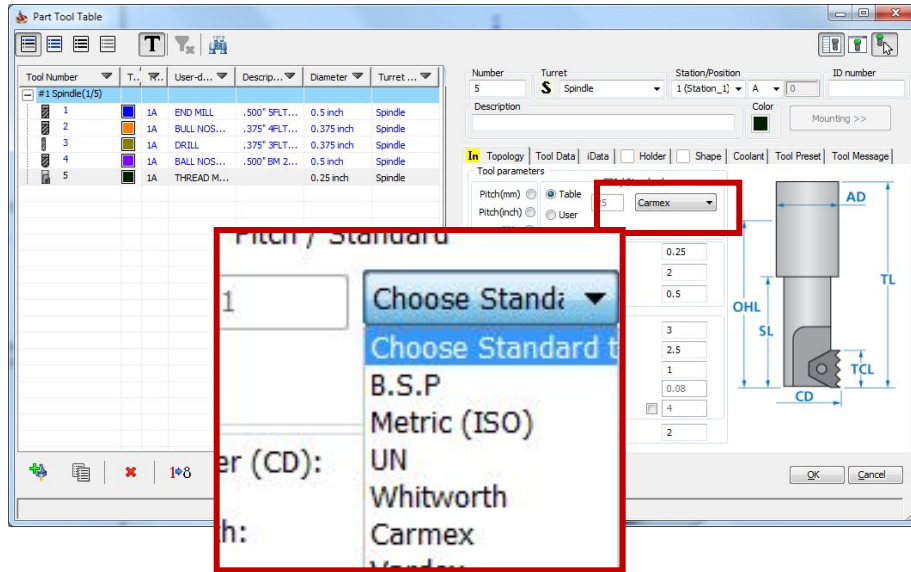
( Carmex software should be installed )

- **Integration at the Tool Type Thread Mill in the Table of Pitch / Standard**
- **Select Carmex from the List - Carmex Tool Recommendation Software starts**

[http://www.vargus.de/](http://www.vargus.de/)

- **Vardex is a Product Line from Vargus for Threading Tools**
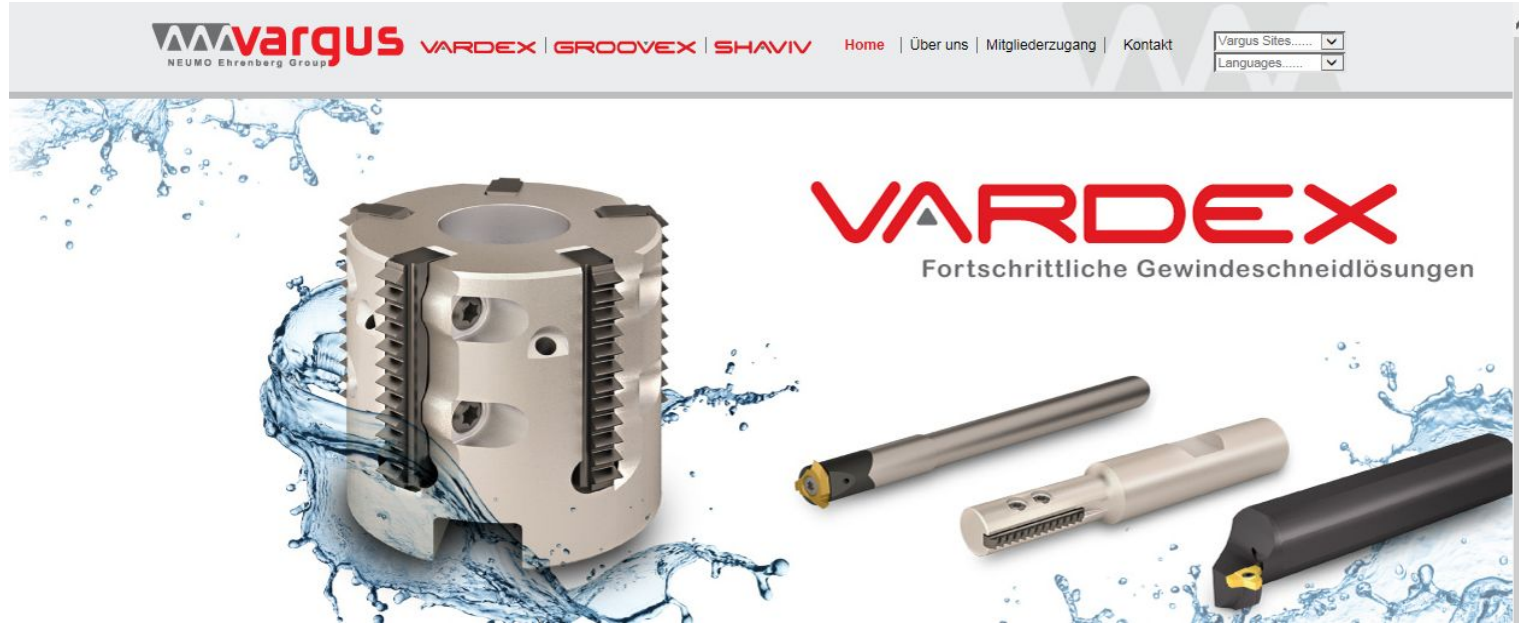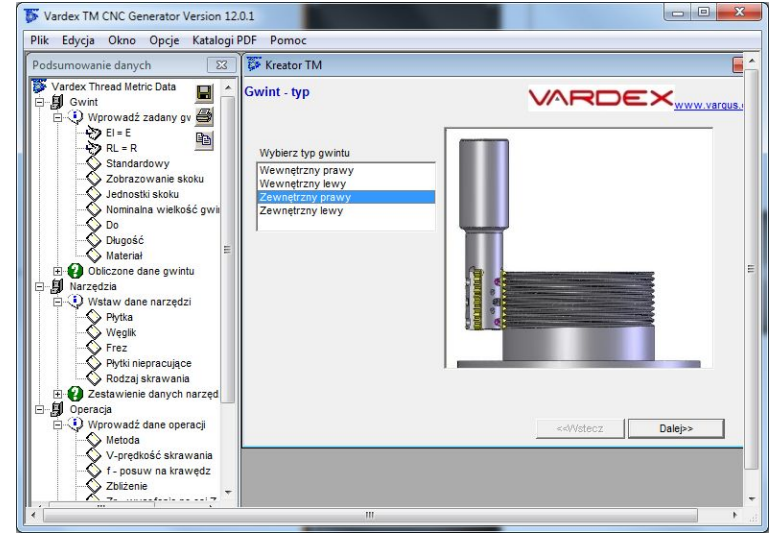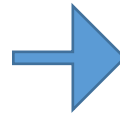
# Integration with Vardex Tool Library
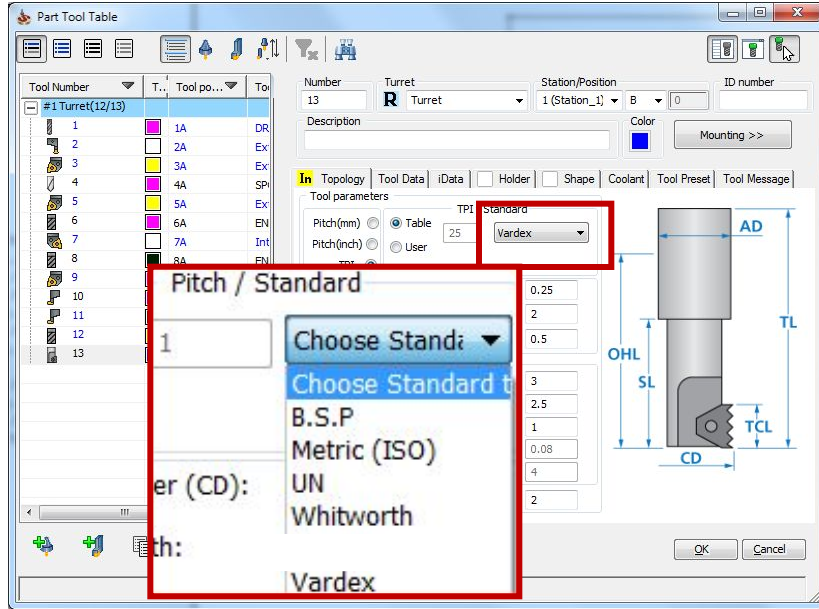
( Vardex software should be installed )

- **Integration at the Tool Type Thread Mill in the Table of Pitch / Standard**
- **Select Vardex from the List - The Vardex TM Assistant starts**

www.inventorcam.com

# Tool Management Softwares Integration

TDM

WinTool

• **Software to manage the overall information of Tools**

# Tool Data Management (TDM) Software

Cutting Conditions

2D / 3D CAD Model

Tool Presetting

Production Information
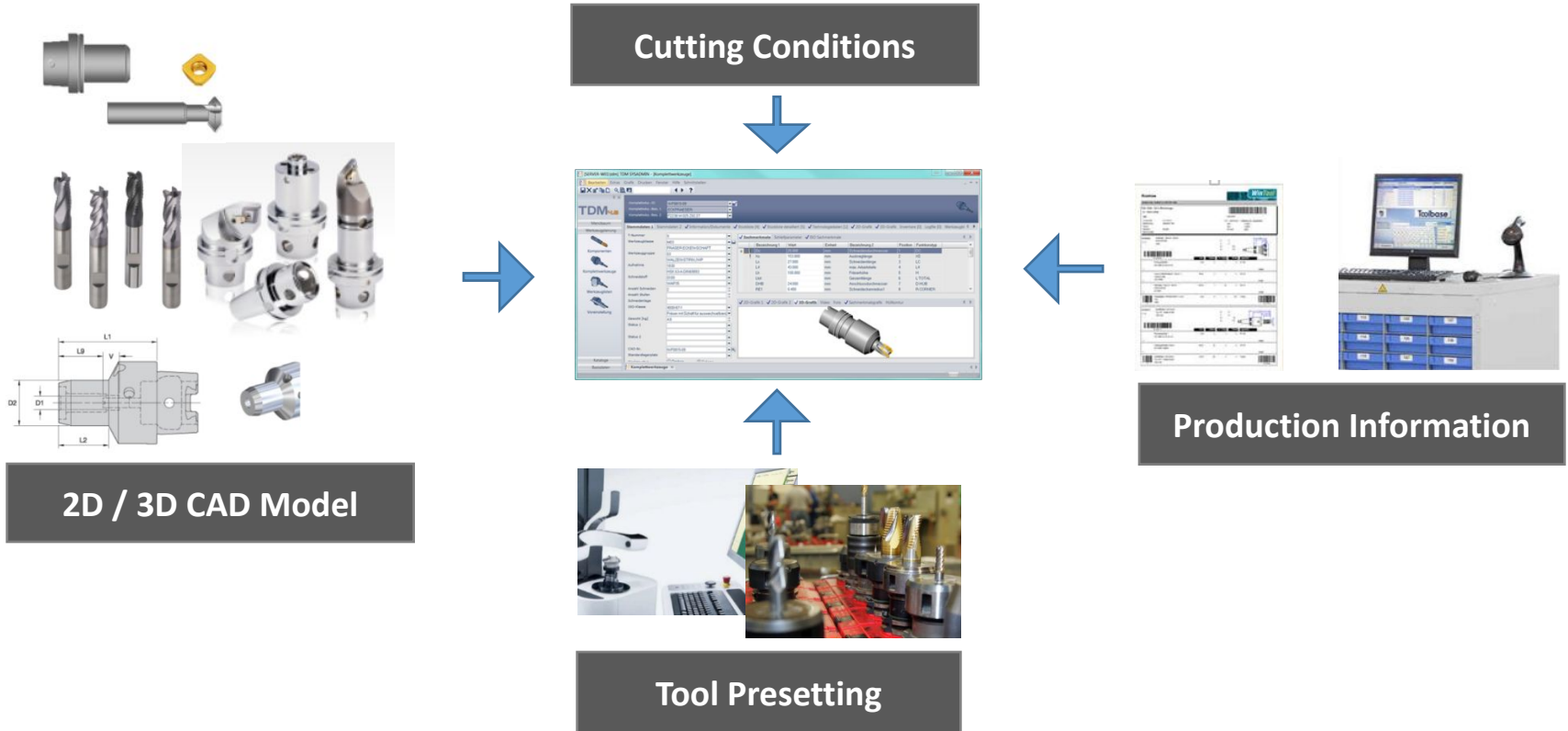
# Workflow using TDM Software

Collect Data → Create a Tool with a combination of Data → Use in InventorCAM Import Tool Option

**e.g. downloaded 2D/3D CAD Models**

**Build a Tool as a combination of different CAD Models and Information**

**Tool with Holder imported from TDM Software**

www.inventorcam.com

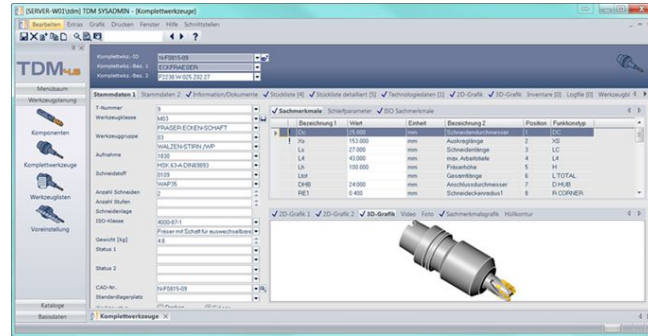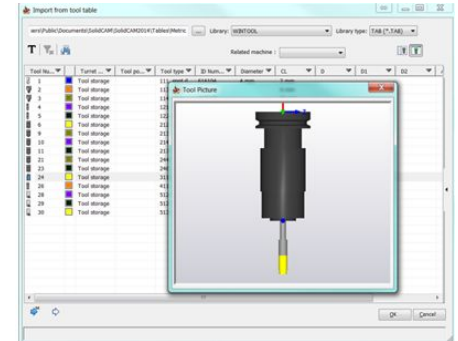**tdmsystems**

**Software for Tool Data Management**

**TDM Base Module**

**TDM Global Line**

**TDM Gauge & Calibration Management**

**TDM Facility & Maintenance Management**

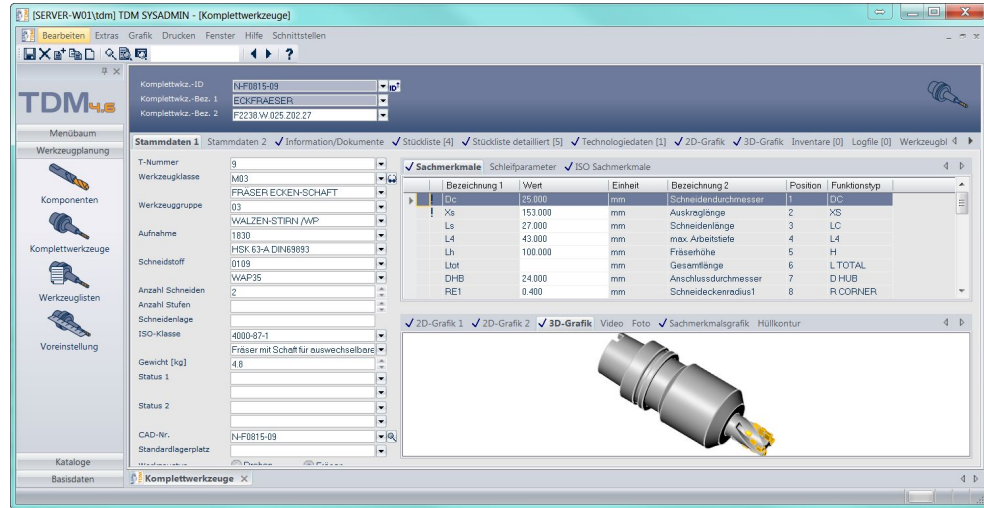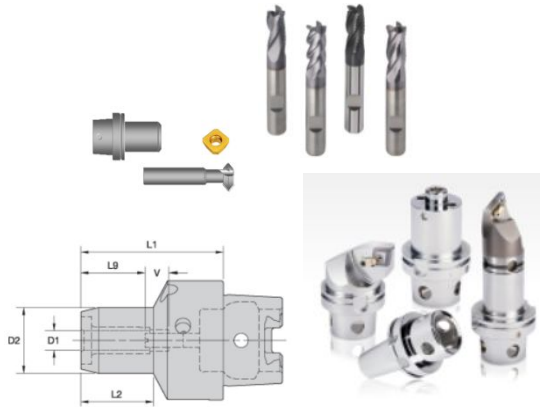**TDM Fixture Management**

**TDM Multi Plant Management**

**TDM**

You Tube http://youtu.be/A3a-jyhMmUY

# Management of Tools and Manufacturing Data in TDM
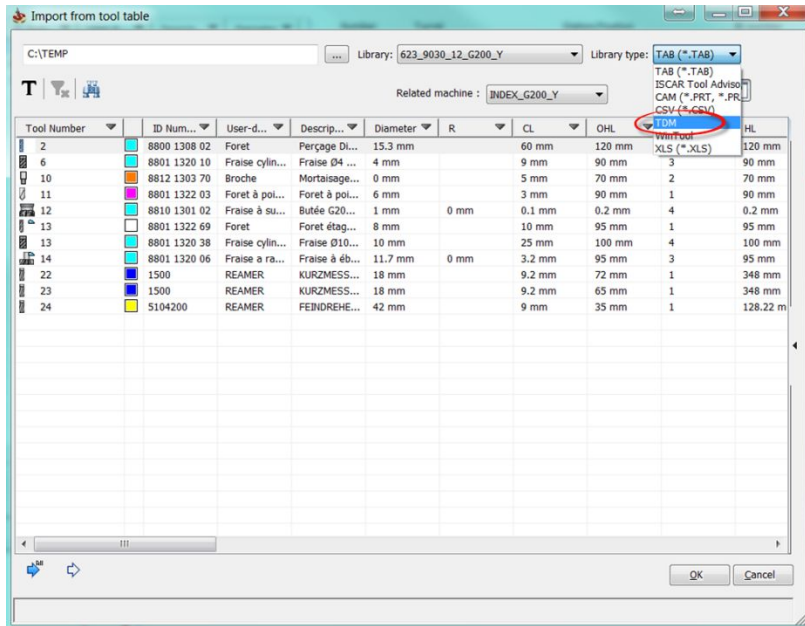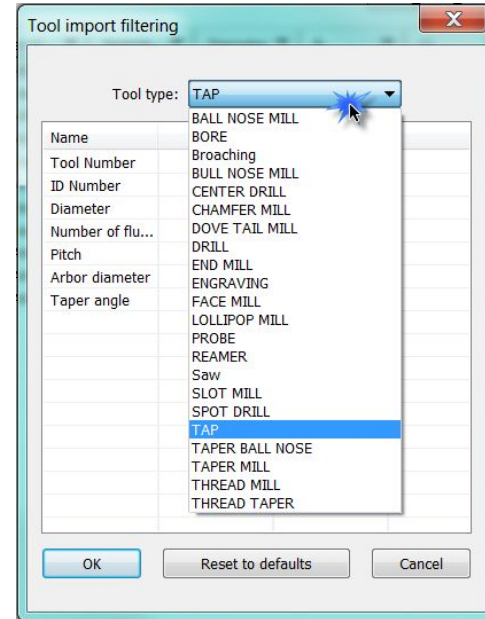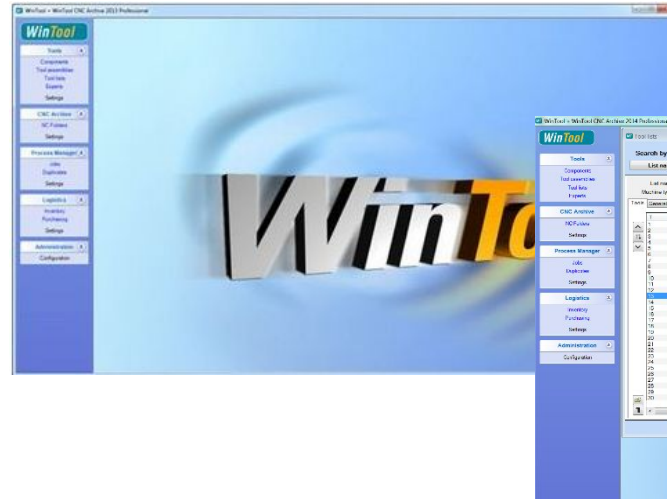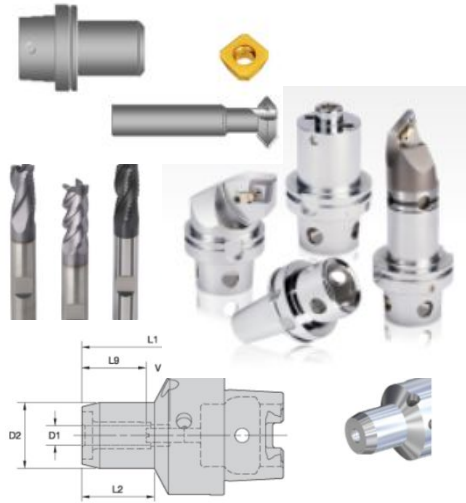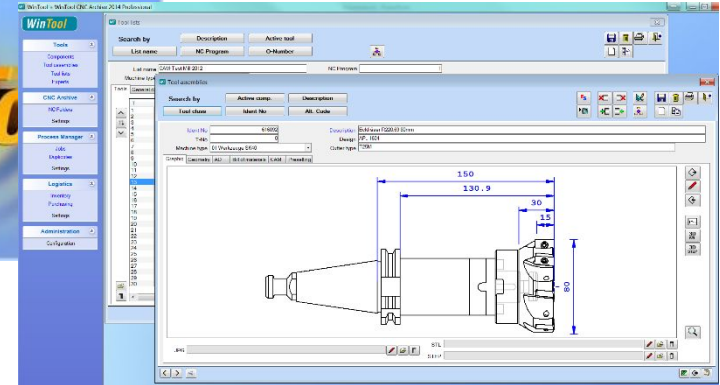


- **Users collect the models form online Recourses and build the Assembly of the whole Tool inside TDM**

- **TDM generates automatically ready to use Data for the InventorCAM Tool Table**

(TDM should be installed at the Client / Server)

Tool Import filtering dialog

- **At the InventorCAM Import Option of Tool table, select TDM – tool import filtering dialog opens**

www.inventorcam.com

For more nformation
click to the Logo

• **WinTool - Software for Tool Data Management**

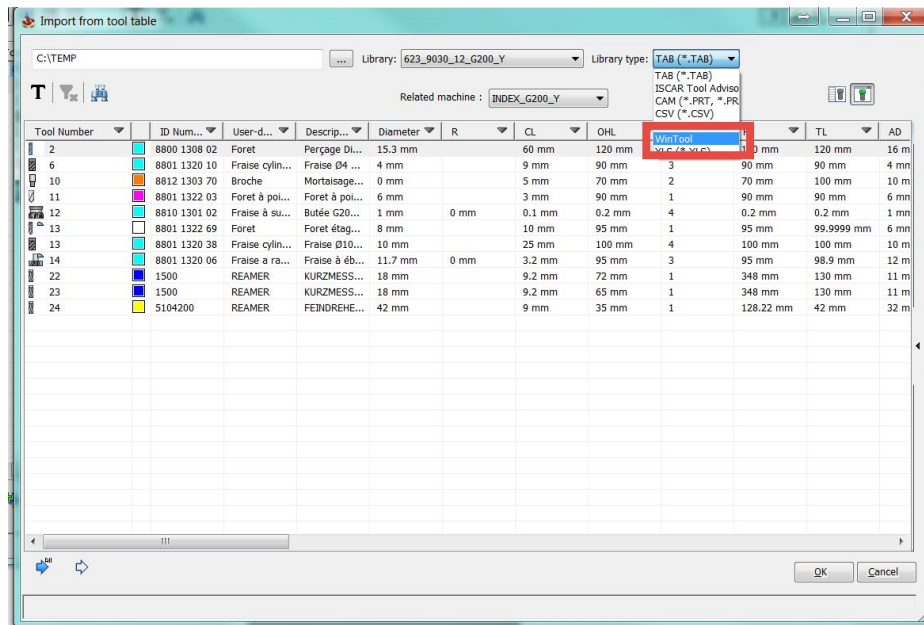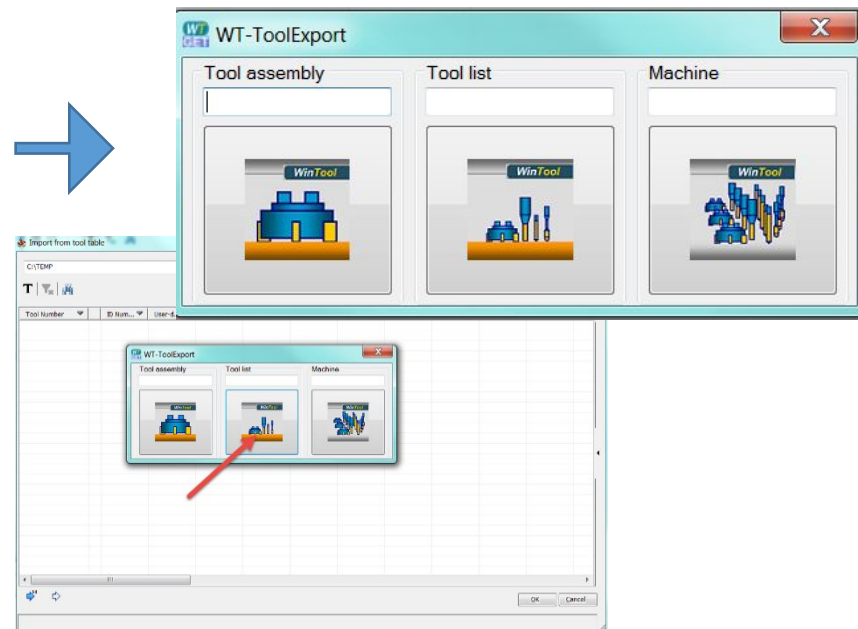www.inventorcam.com

- **Users collect the Models form Online Recourses and build the Assembly of the whole Tool inside WinTool**

- **WinTool generates ready to use Tool Data to import to InventorCAM ToolTable**

www.inventorcam.com

(WinTool Professional should be installed and started)

- **At the InventorCAM Import Option of the Tool table, select Wintool - Tool Export Dialog opens**