SprutCAM 10

What's New

New and redesigned machining strategies

New machining strategies:

- Scallop operation

- Face Milling operation

- High speed cutting

- Knife cutting operations

- Jet cutting 4D operation

- Welding 5D operation

- Cladding operation

- Flexible axis feature

- Facing cycle
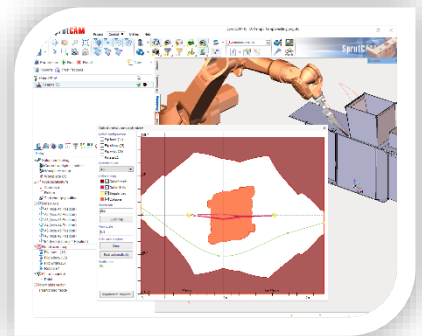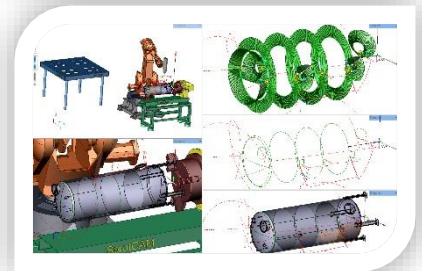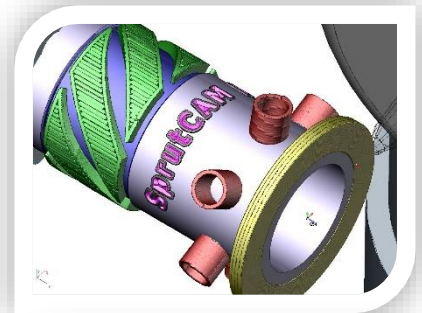
Redesigned machining strategies:

- Finishing optimized plane and Finishing complex operations

- Robot optimizer feature

- Feature based machining & Shaped cutters (FBM)

Visualization, simulation and user interface

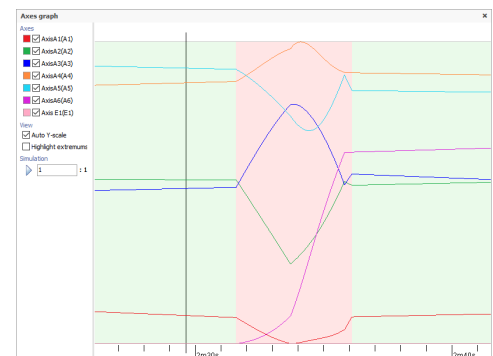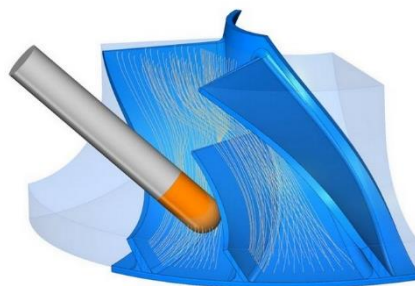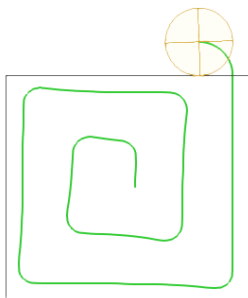- Updated 3D visualization
- Toolpath visualization enhanced
- New simulation types added
- Rotary machining job zone parameters visualization
- Live toolpath preview
- New Axes graph window added
- More comfortable lathe cycle properties editing
- New cloud interactive help system designed - Smart hint
- New machine selection window created

3D Model and geometry kernel

- Internal STEP format import enhanced
- Native Parasolid format import
- Reimport 3D model feature
- Associativity support for the STEP and Parasolid file formats
- Addins for CAD systems
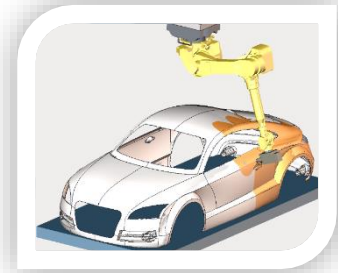
Cutting tool

- New cutting tool types for undercut machining
- Two tooling points using

Scripting possibilities

Machine schemas

- Shortest path axes rotation
- New machines support added
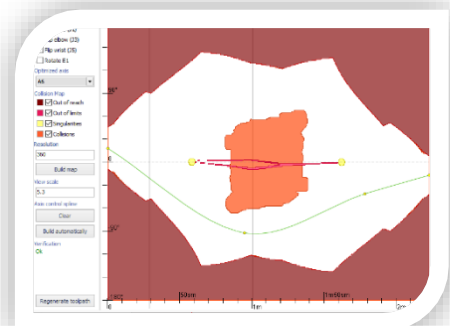
Postprocessing

- New toolpath frame output formats added
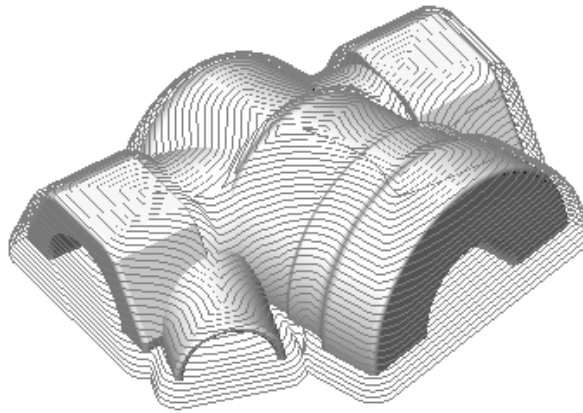
Scallop operation

Scallop (or 3d constant stepover) tool path starts with curves lying on the part surfaces and repeatedly offsets them inwards until the curves collapse. A consistent stepover across the part surfaces is guaranteed The tool path is well suited for high speed machining of complex molds and sculptured models.

Features:

- Lightning fast toolpath calculation.
- One entry, one exit. It is possible to machine a whole part with a single continuous spiral-like toolpath with only one entry and one exit points.
- High speed machining. It is possible to generate a toolpath with rounded corners.
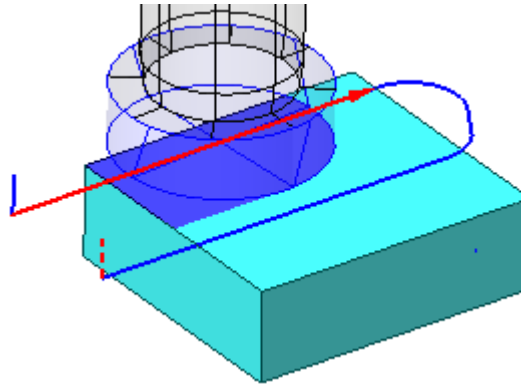
Face Milling operation removes stock from the top most level of the part. Three strategies are available.

- **High speed spiral**. With this strategy a spiral-like tool path is generated. The tool path is guaranteed to never exceed the given stepover, so you can set the maximum feed rate for machining without worrying the tool will break The sharp corners of the toolpath can be rounded. The Roll-in technique is used to maximize the tool life. Stepovers up to 99% of the tool diameter are allowed.

- **Zigzag**. A simple zigzag like tool path is good for removing a thin material from the top of the workpiece. It is designed to be efficient. No air cutting is done. Even the link moves between slices can be done in the material.

- **Parallel** (climb and conventional).

Face Milling operation
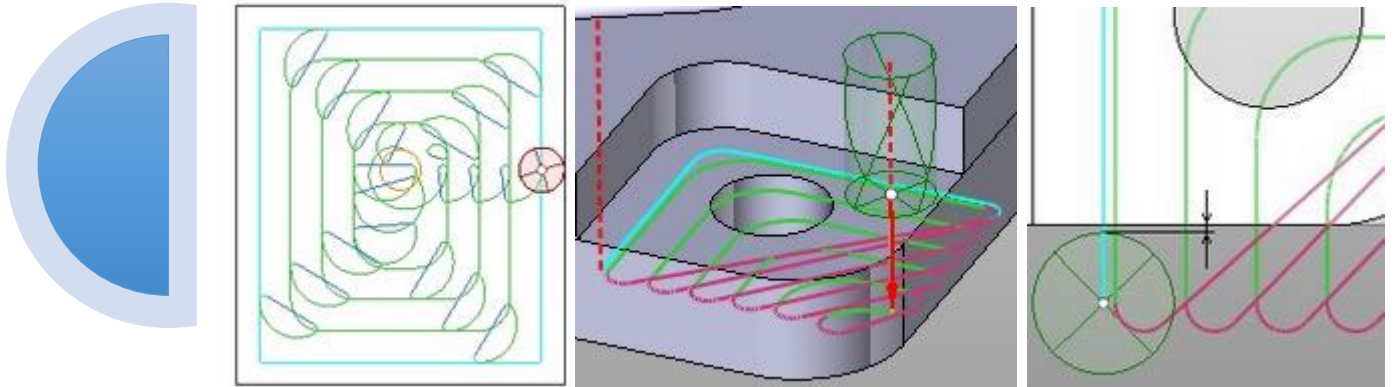
High speed cutting

New trohoidal arcs reduce the tool path length on 20% in compare with version 9. Tool load is much more smooth. Most of the links are rounded. A lot of the links are performed without retraction on the safe level.

Advantages:

- smooth cutting
- longer tool life
- shorter tool path

Available in operations:

- Roughing waterline
- Pocketing
- Flat land finishing

Knife cutting operations
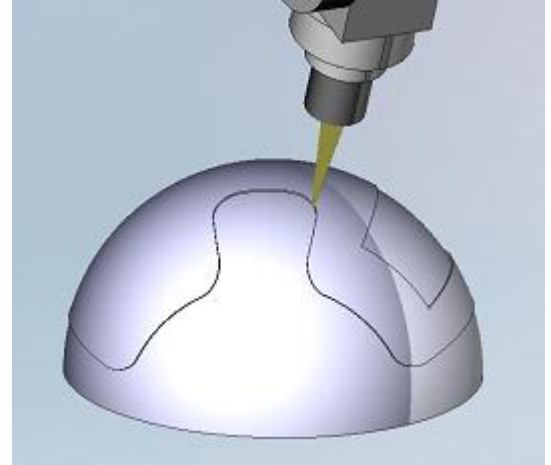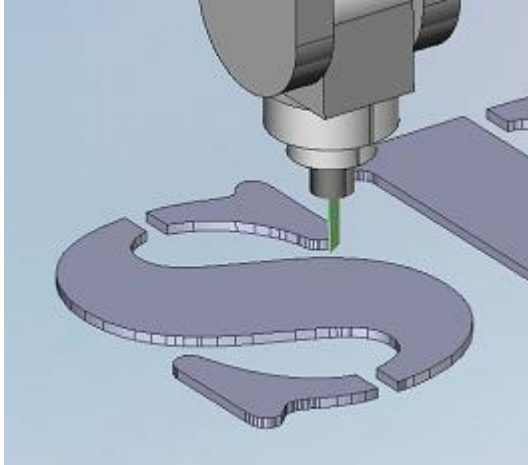
Knife cutting operations 2D and 6D are developed to control the tool that must be directed along the motion. It can be knife, band-saw, disk-saw etc. In the common case it requires 6 simultaneously controlled axes.

Features: possibility to use the new kind of a tools, automatic knife orientation and inclination angles calculation for lead in/out and working motions.

You Tube

Jet cutting 4D operation
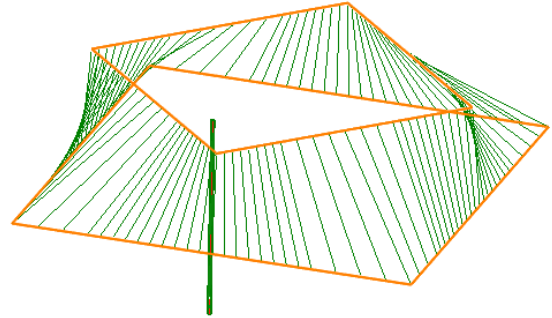
Jet cutting 4d operation can be used for hydro, laser, plasma etc. cutting types where the tool is a jet or a beam. It allows to machine simple elements and also more complex elements with inclined sides. Working contours are set the same wa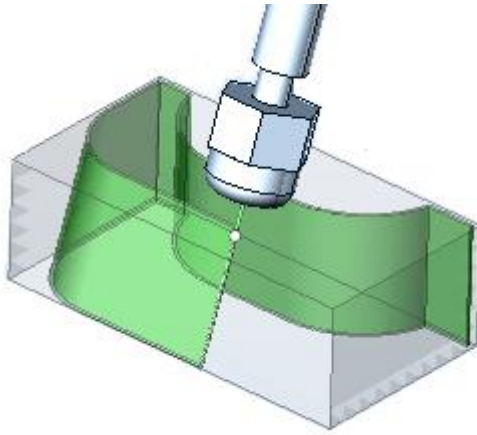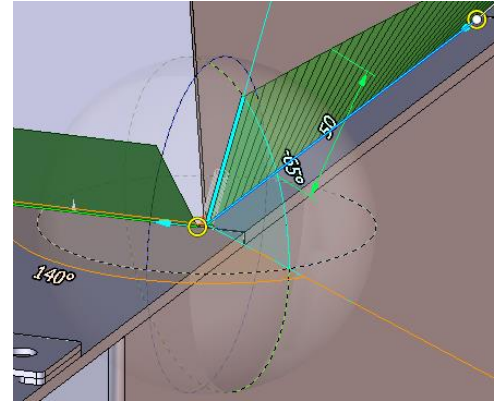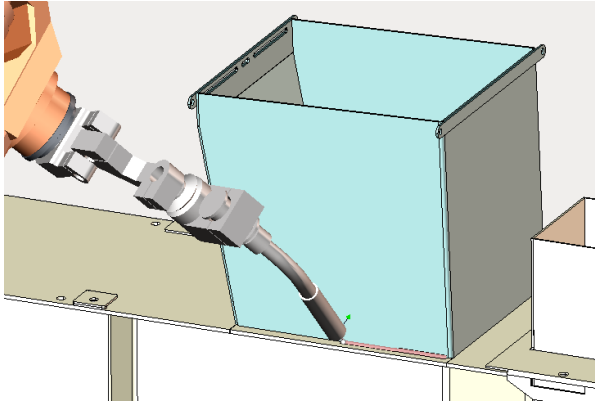y as in the Wire EDM operations, however, the resulting path is generated in the format of "point + normal" or "point + rotary axes of the machine."

Welding 5D operation

It implements the functional of automatic weld seam geometry calculation without reference to a particular type of welding equipment (i.e., does not generate the specific commands to the laser, electric arc, gas burners, ultrasonic device, etc.). It is enough to add the edge between welded parts to the Job assignment and the system automatically calculates the angles in each curve point so that the welding head is held as close to the middle between the adjacent walls and do not collide with them. Then you can switch to the Simulation mode to see how the material is added to the place where the tip of the welding head is touching.

You Tube
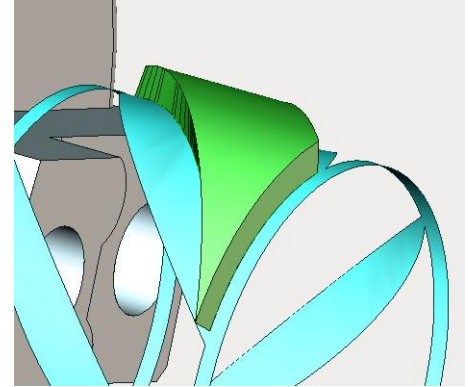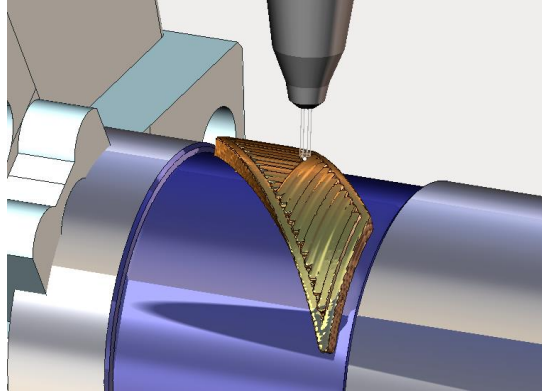
Cladding operation

It implements the concept of additive manufacturing, when, in contrast to a cutting the material is not removed, but added to the workpiece during the machining process. It allows, for example, to build on the surface of the workpiece the layer of material having specific characteristics: high hardness, strength, wear resistance, anti-friction properties, corrosion and heat resistance, etc. It allows also to restore the geometric dimensions of costly parts and tools, to repair blades, dies, molds, gears, shafts, etc. The interface of job zone definition and the set of parameters is similar to the pocketing operation. It allows using curves and edges of the 3D model to restrict the area in which you want to make a buildup of material. Depend on the selected base surface this area can be positioned on the plane, cylinder or on the revolution body. And when the "Project toolpath onto the part" option is enabled, cladding in general can be made on the surface of an arbitrary shape. Operation has Parallel and Offset strategies to fill the area. You also can define total layer count and side angle for the walls.
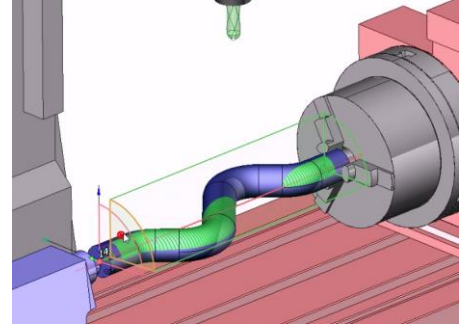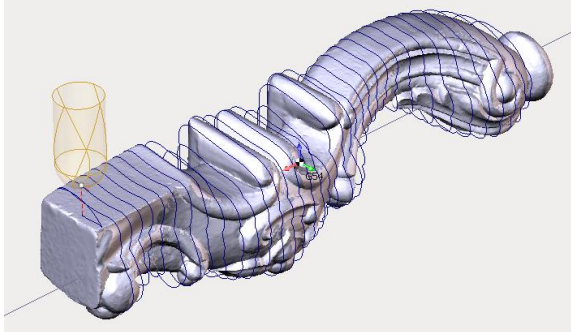
Flexible axis feature

Flexible axis feature added to the Rotary machining operation.

It can greatly simplify the processing of parts "such as the crankshaft," in which there is a clear axial asymmetry.
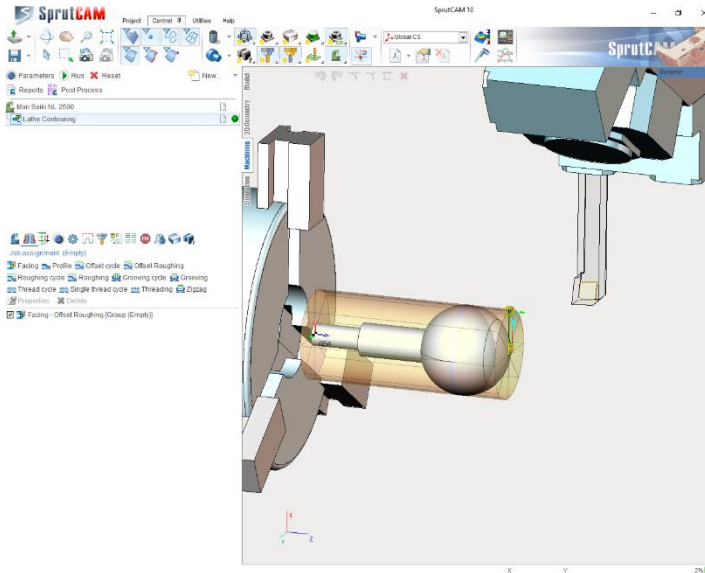
When this option is enabled, the axis about which the work passes formed begins automatically be considered as the arithmetic mean point in each of the sections.

As a result, the trajectory is obtained uniform, without breaks, with the correct tool axis orientation change relative to the part.
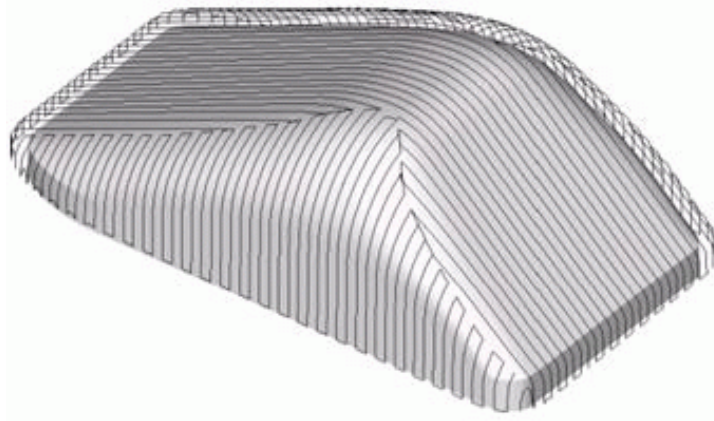

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Facing cycle

New Facing cycle added to the Lathe contouring operation

It allows to program facing operation with only one mouse click. Toolpath generated same way as in Profile or Offset cycles just source geometry is changed. It automatically calculates source curve as left or right face of the part with extending it to the current workpiece area.
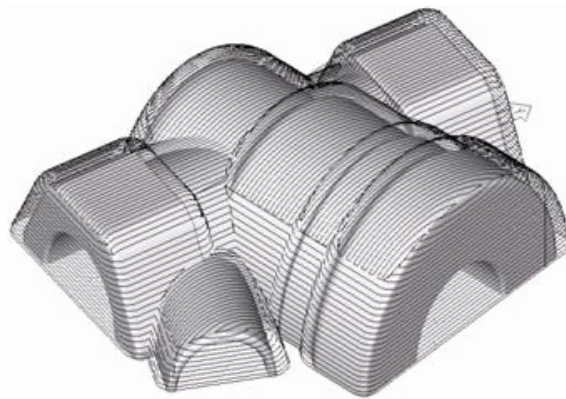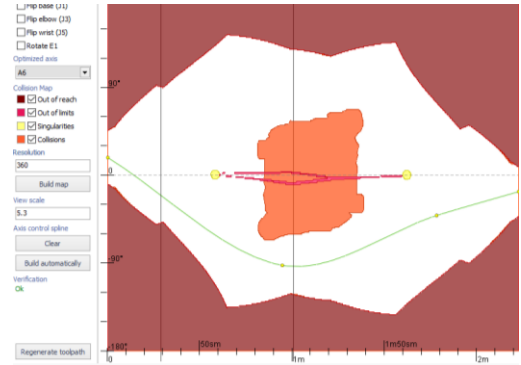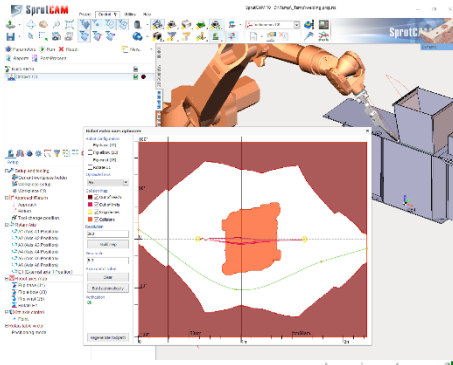
Finishing optimized plane and Finishing complex operations

In the previous version these operations consist of two operations with different parameters contained in one group. This gave some discomfort at work. Now, each of these operations is a complete and indivisible operation.

Robot optimizer feature

The UI and the comfort of using of the "Toolpath optimizer" window enhanced. The scales and the slider added for easier tracking of the current position. Now different kind of errors on the map displayed in different colors (unreachable areas, axes out of limits, singularities). Collision detection zones visualization added to the map. Changes in a map may be applied directly to the toolpath without the need of complete operation recalculation.

The list of strategies expanded to control the rotary table. Now, the system allows to calculate the position of the table depending on the tool axis orientation or position of the tool tip relative to the axis of rotation, or with a combination of both previously mentioned laws.
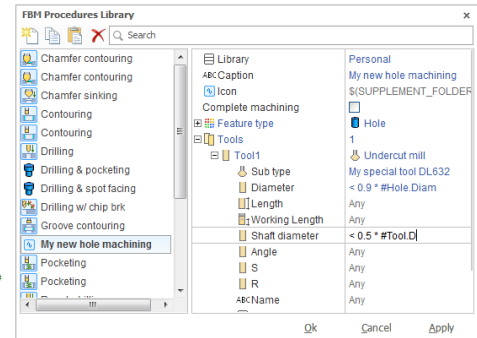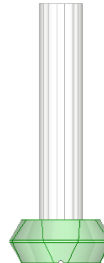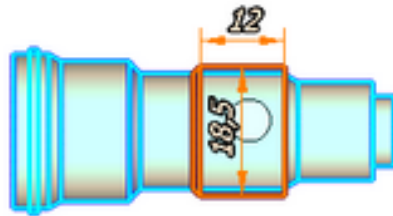
Major improvements in the UI and stability

New Hole Groove feature

HoleGroove

The functionality of the Feature based machining extended with Hole grooves machining. In addition to the previously implemented feature types "Simple hole" and "Stepped hole" recognition of "grooves in holes" added (rectangular, trapezoidal, round, shaped, etc.). For grooves became available following machining strategies: boring, rough pocketing, rough and finish contour milling, chamfering. Thus, with FBM become possible to easily and quickly complete programming of machining cycles for holes of any complexity.

Shaped cutters in FBM

In FBM the ability to use shaped tools created by the user added. Thus, if the machining of any element type requires a special tool which is not in the system, the user can draw the parameterized tool contour and save it as a new type of tool. All the parameters that the user has placed in a new tool (diameter, height, rounding radius, angles of different tool parts) can be used in the expressions, which the selection of the optimum tool based on.

Feature based machining (FBM)

Updated 3D visualization

New Advaced rendering mode with the latest OpenGL features. Intel embedded video card bugs resolved. Significantly increased the speed of the NVIDIA graphics card. New "Rendering mode" combo added to the System setup window. It allows to change rendering mode depend on your video card possibilities. It can help to resolve problems if your graphical adapter does not support some of the visualization features.

Suitable video card selection procedure added to the installation utility in the cases when your PC has more than one video card.
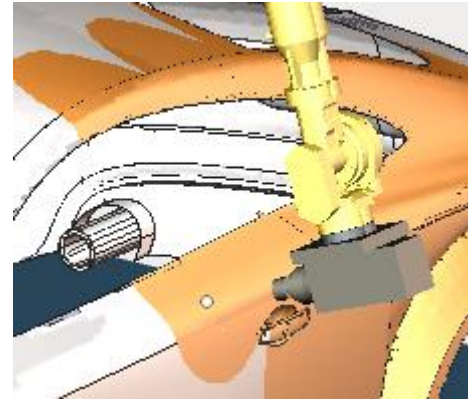
Toolpath visualization

Toolpath colorization depend on feed type now is possible (rapid, approach, working, retract etc.). Correspondent move command in simulation tree colorized same way. Current movement now displayed as red bold line with arrow.
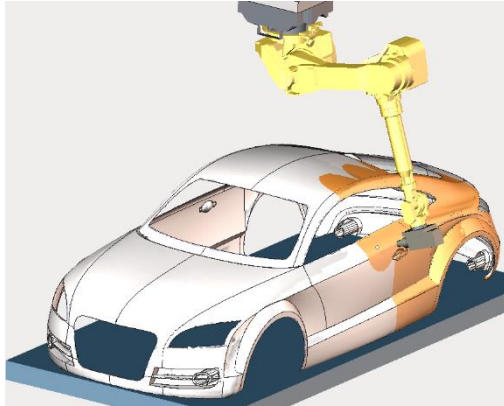
Simulation types

Additive simulation - adds material to the workpiece at the point where the tool has passed. It is used to simulate the processes of welding and cladding.

Painting simulation - does not add and does not remove material. It just colorize the surface of the part or workpiece following the tool. It is used to simulate painting and heat treatment processes.

Rotary machining job zone parameters visualization

Rotary machining job zone parameters visualization now performed directly in the graphical window. Stand up to the corresponding parameter in the properties inspector to make it visible. To change one of the job zone sizes you can mouse drag corresponding side of the visualized sector or specify the exact numerical value in the text box that appears next to dimension line.

Live toolpath preview
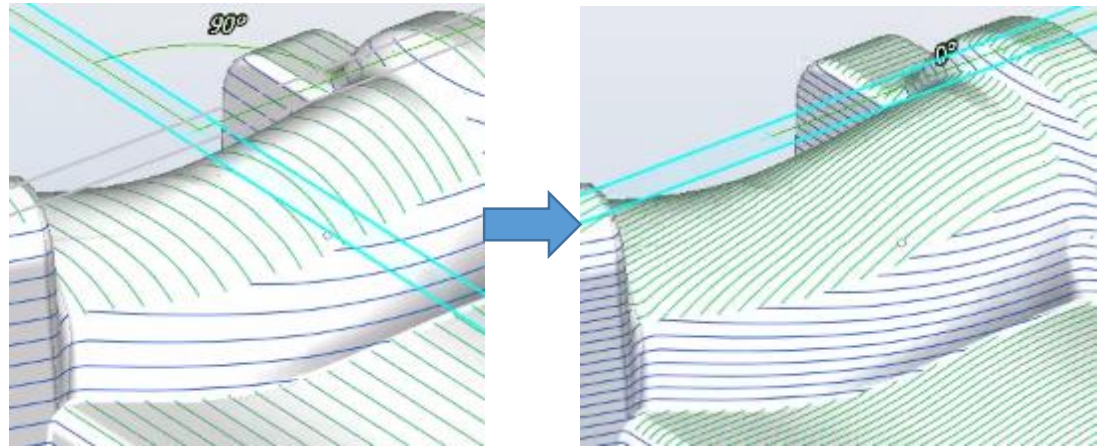
The operations like Waterline and Plane now have special preview of toolpath that appears when you click to one of the parameters inside properties inspector. When you changing parameters, for example, machining step, angle of passes, or job zone angles, it is updating in live time. You can change some of the properties in graphical window directly by dragging corresponding objects.

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Axes graph window
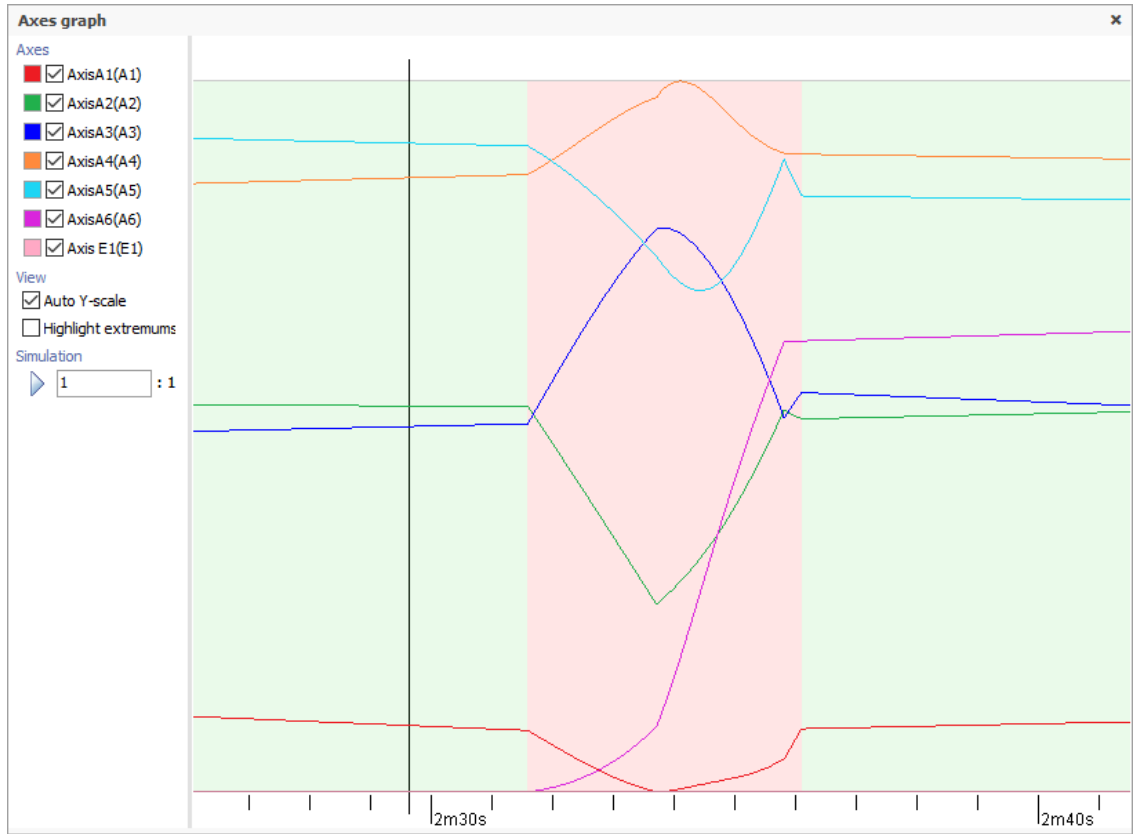
It allows to see the changes of machine coordinates depending on the length of the toolpath. This makes it possible to get an idea of the rate of changes, detect frequent direction changes, identify the potentially dangerous places with bounce.

More comfortable lathe cycle properties editing
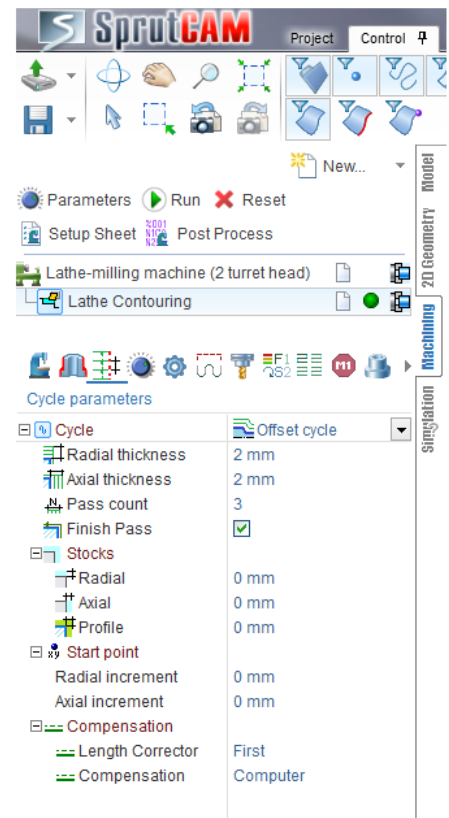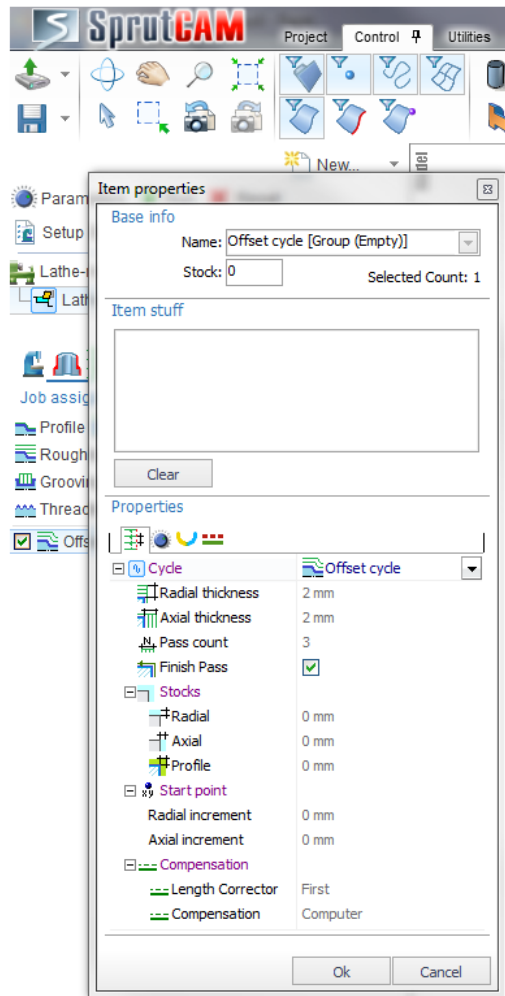
Lathe cycles' properties of the Lathe contouring operation that was placed in the second level dialog window now moved (duplicated) to the main properties inspector of the operation similar to the all other operation options.
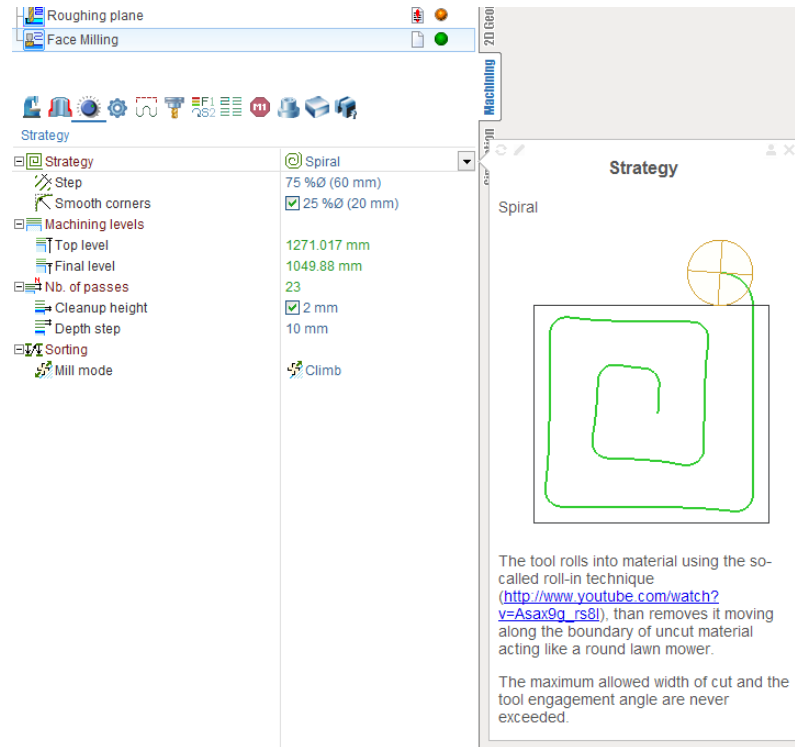
Smart hint

New cloud interactive help system designed. If you see an unfamiliar new parameter and have seen a question mark next to it you can click on it. A tooltip will appear. In addition to the textual explanations it can contain pictures, videos and links to training materials. The information is loaded from a cloud help storage, and if it is not available, then from a locally installed distributive. And if you are an advanced user and have the special access rights, then you can login and edit this content. You can explain the meaning of the required parameter in your own language and share that information with SprutCAM users worldwide.

Machine selection window
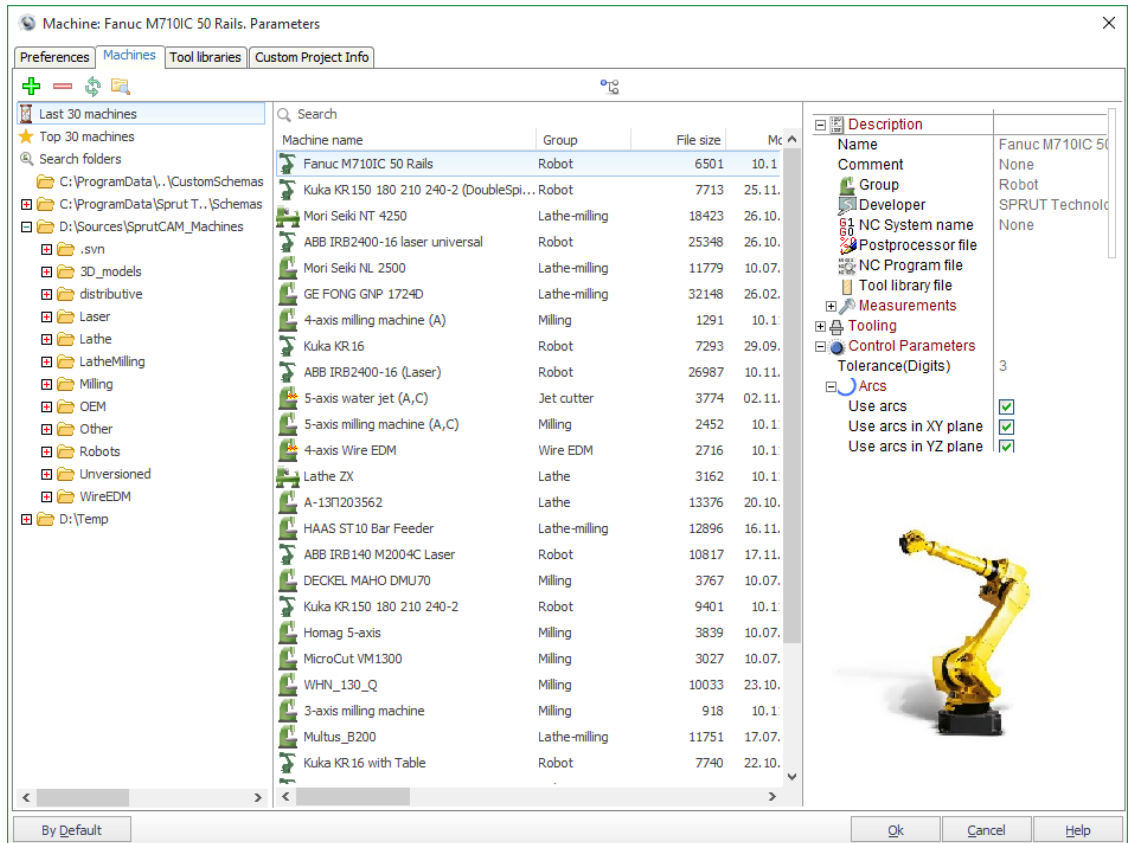
It allows to select and add new machines much faster, simpler and reliable. If you do not see desired machine in the list, just put the machine file to one of specified folder, or add the folder where you keep all your machines to the search path list and just click "Refresh" button. Forget about the inability to connect the two machines with the same identifier. Now you can even switch between different versions of one machine in a single click. Moreover, if the machine file was updated, there is no need to restart the entire CAM, just press "By default" button in the machine selection window. By the way, if you open a project and the system will detect that it was created using a different version of the machine, it will show a warning and offer to upgrade it.
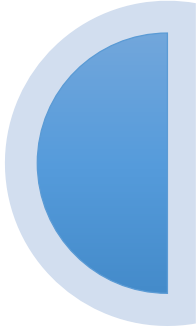
Internal STEP format import
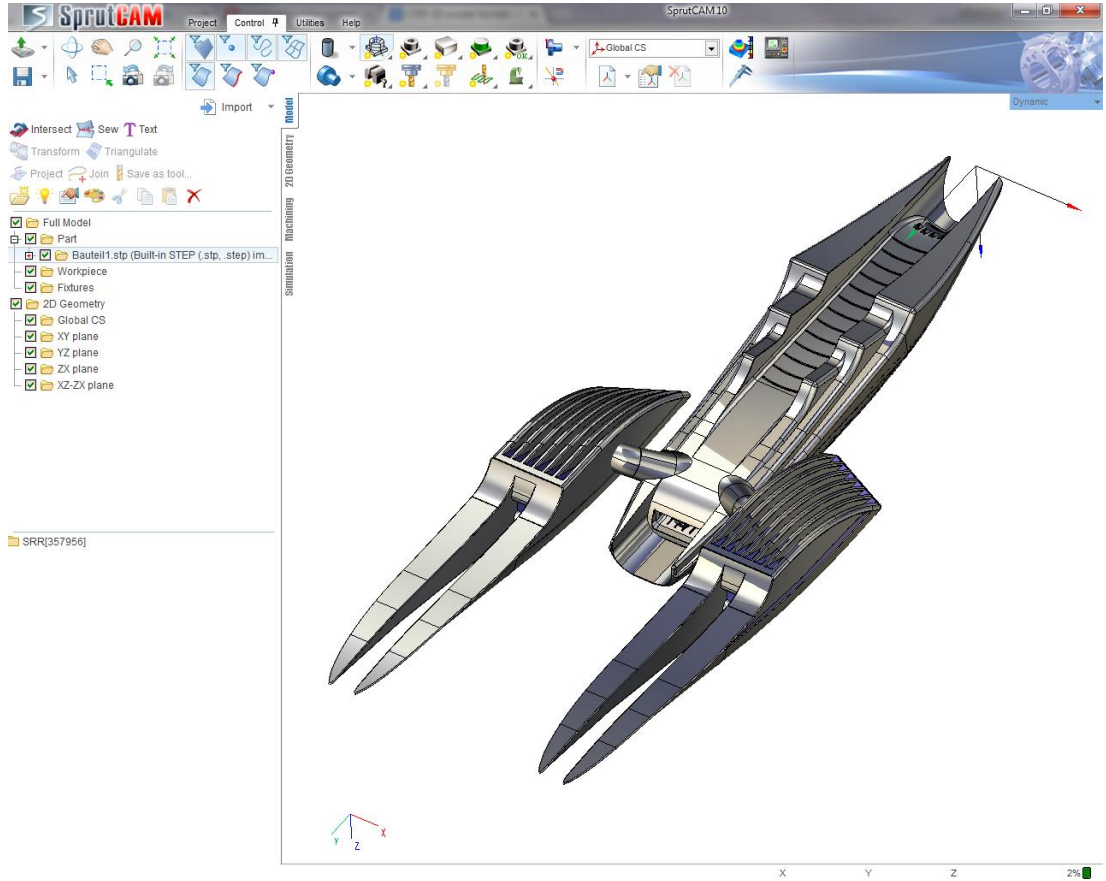
Supports the following model types

- wireframe
- surface
- solid bodies

Schema files

- CONFIG_CONTROL_DESIGN
- AUTOMOTIVE_DESIGN

The standard extensions of files are step; stp.

Native Parasolid format import

SprutCAM 10 supports the Parasolid™ data transmission format up to 25.1 versions.

Parasolid™ is the core of a geometrical modeling format which supports the following model types:

- wireframe
- surface
- solid bodies
- finite elements

The data transmission format of Parasolid™ allows the user to transfer data not only about the model, but also the relations between models.

The standard extensions of files are x_t; x_b.

To design a machining technology, information concerning the object geometry is required, and such attributes as light source, background color, transparency or smoothing angle, animation elements and event processing are irrelevant and therefore will be ignored.

Reimport 3D model feature
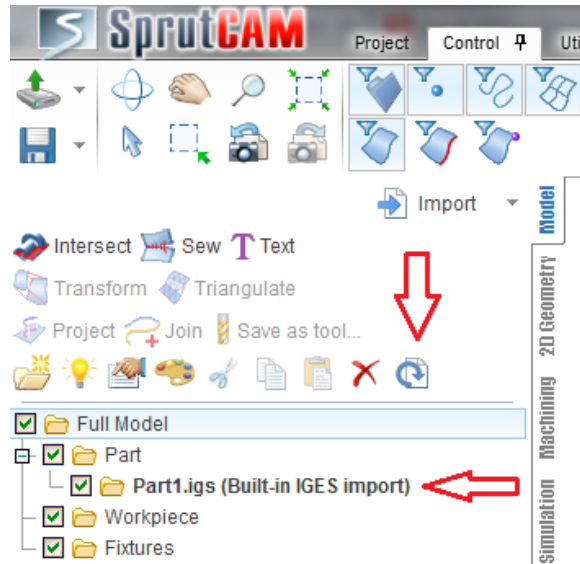
Now when you import any 3D model to SprutCAM the name of the source file will remember. Then if this file will change you just will the see special mark next to the corresponding folder in the 3D Model tree of SprutCAM and "Reimport" button will became visible. It is enough to click this button to get newest model inside your SprutCAM project.

You Tube

STEP / Parasolid associativity support

Now when you import similar STEP or XT files then all similar 3D model items must have same identifiers. Even after sewing of the model the edges must save their names (they consists of the names of the left and right connected faces). So you can simply use similar 3D models in one project without need to recreate full project again.

Addins for CAD systems
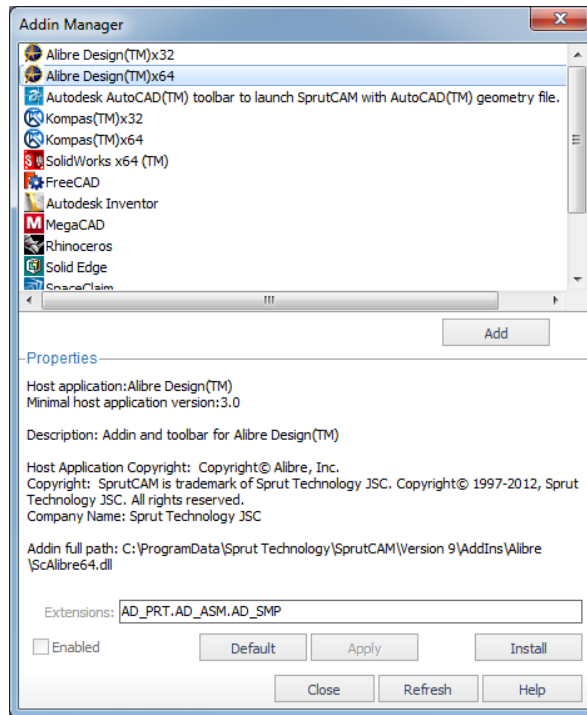
All addins for main CAD systems was updated for using with the last version of corresponding products: SOLIDWORKS 2015, SpaceClaim 2015, Inventor Professional 2015, Rhinoceros 5, etc.

SprutCAM
What's New

Cutting tool types

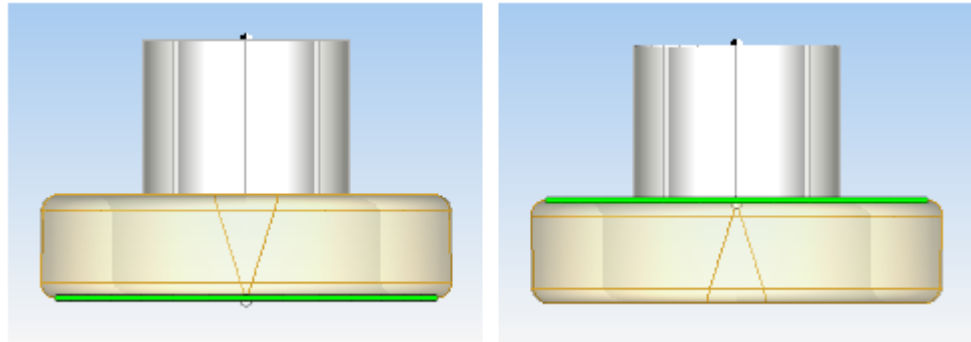New cutting tool types for undercut machining:

• Round groove mill
• double-side chamfer mill with sharp and rounded edges
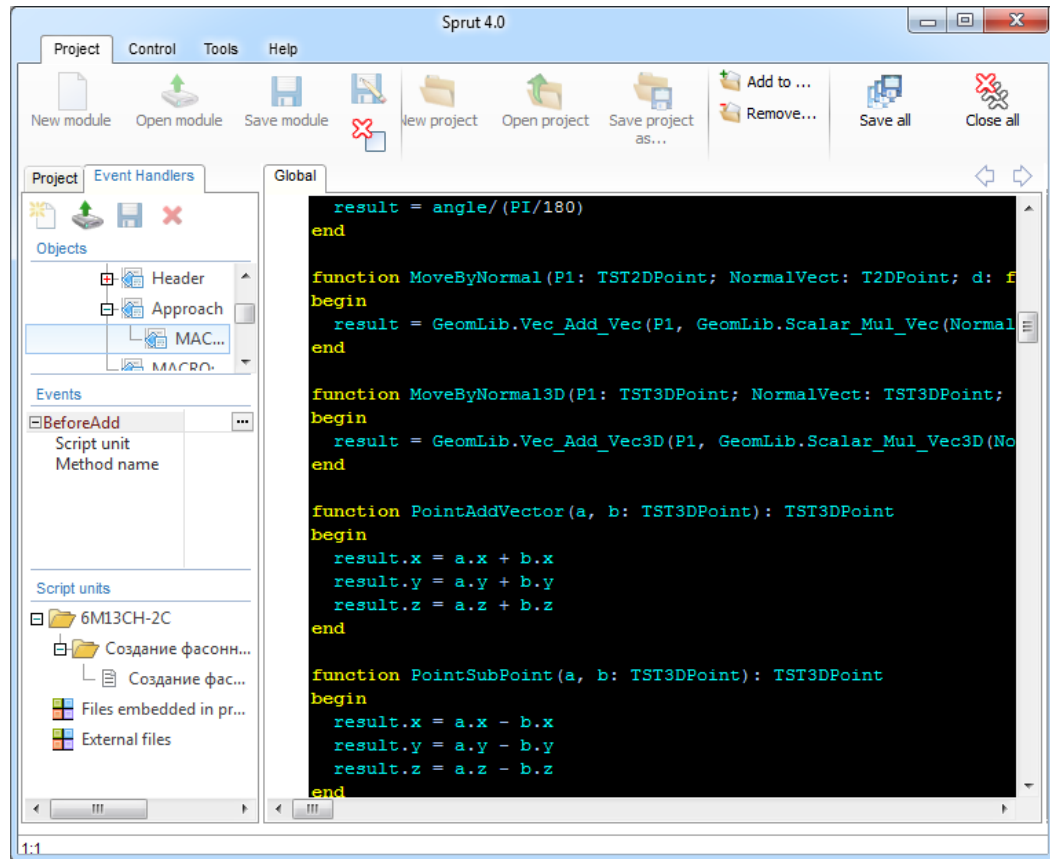• indexable chamfer mill

Two tooling points using

In the hole machining cycles of the FBM the ability to use several tooling points (two tool correctors) in one operation added. It is useful, for example, while boring or milling groove inside holes.

Scripting possibilities

Advanced possibilities of script programming language. Allows to adopt existing operations with defining scripting handlers on operation events. Also you can add your own script based operations. API is used to get access to the operation parameters and calculation kernel. It is possible to include external libraries (DLL). Advantages: possibilities of unique special operations creation, or changing of existing operations. Integrated programming environment. Object-oriented access to the operation parameters.

Shortest path axes rotation
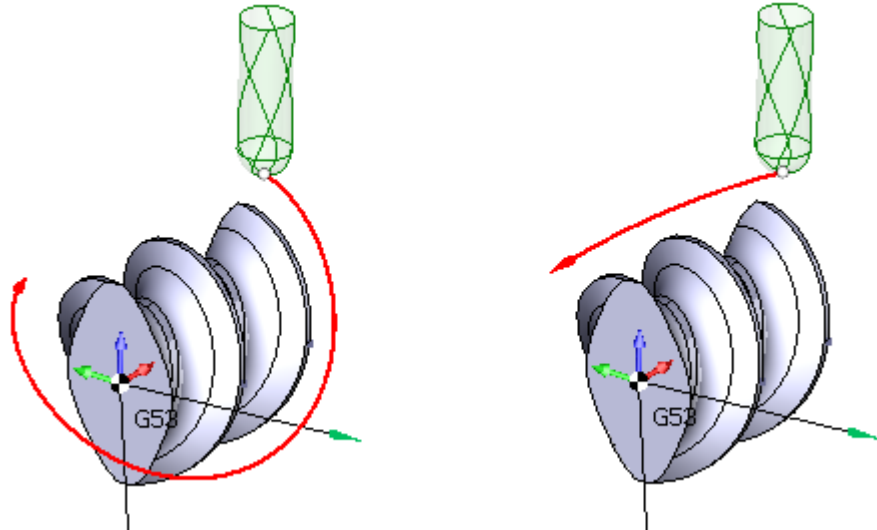
New property added to the machine axis description structure 'Support shortest path rotation'. If it is enabled then simulation system will select direction of rapid feed rotations for this axis automatically depend on what path will shortest. For example, movement from 15 degrees position to 350 degrees will rotate axis on -25 degrees instead of +335 degrees.

Machines support

New machine schemes for robots Universal Robots, Denso, Ever, Kawasaki, Manutec, SunLiFia, Mitsubishi, Toshiba, Panasonic, Nachi and many other milling, lathe-milling, wood, etc. machines added. Machine scheme description modified to be possible to use solutions with the controlled 6th degree of freedom (rotation around tool axis). This may be various circular saws, knife cutters, laser temper equipments, etc.
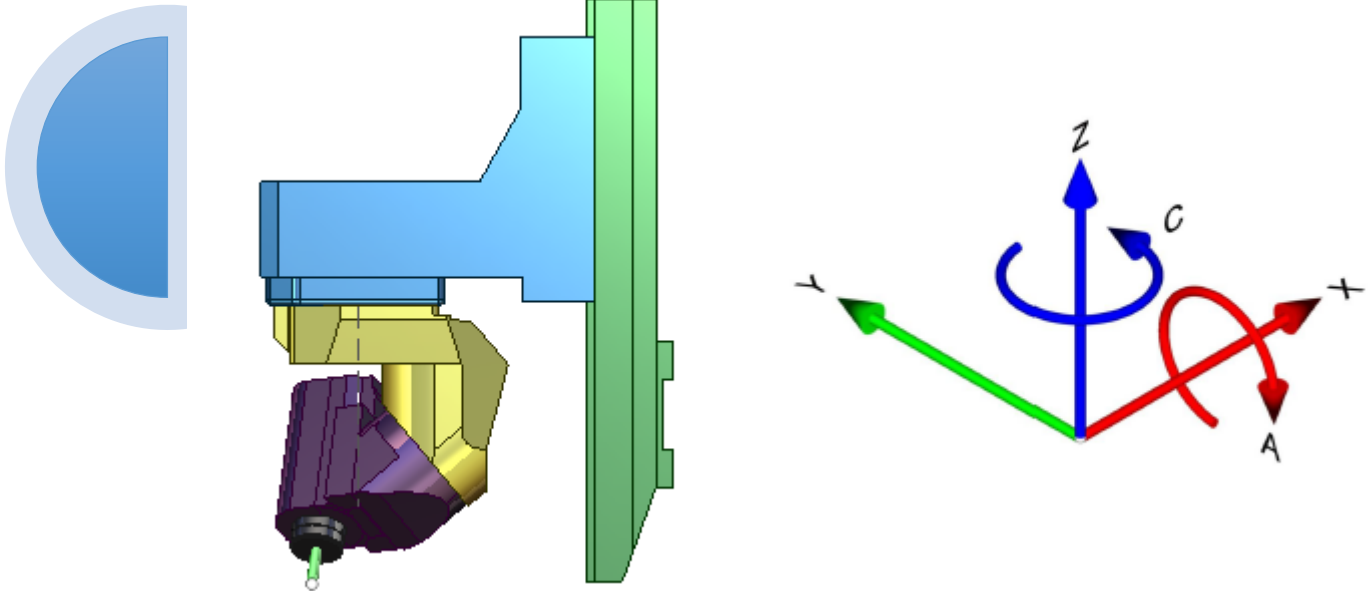
New toolpath frame output formats added

- «Two angles AB»
- «Two angles BC»
- «Two angles BA»
- «Two angles AC»

Usually tool orientation described with three spatial angles A, B and C in various order (exactly inside multi-coordinate MULTIGOTO motion). When using one of the new formats orientation of the tool recalculated such way that tool axis will be unchanged but one of the A, B or C values becomes zero (coordinate system rotates around tool axis). Then tool orientation unambiguously defined with only two spatial angles. It is useful while writing postprocessors for special types of machines such as wood multiaxes machines or machines with inclined rotary axes when physical rotary axes' values don't match to the common spatial orientation angles and manual recalculation between different angle types is difficult.

Toolpath frame output formats
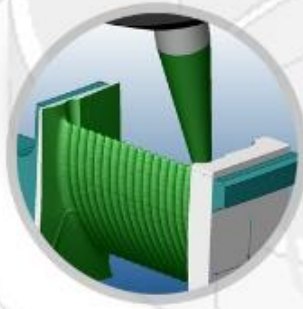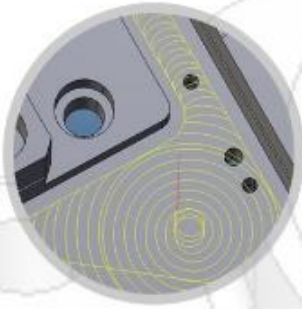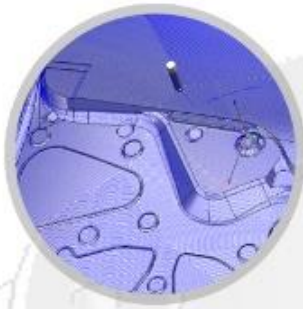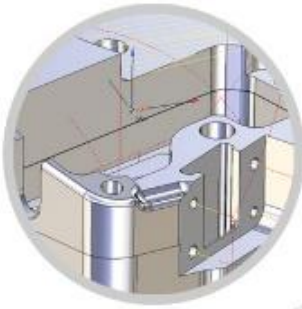
SprutCAM

The area's of application for **SprutCAM** range from, large machines (for example, in heavy mechanical engineering), down to engraving (in the jewelry or watch industry); from simple two-axes processing for cutting machines (laser/waterjet etc.), right up to complex multi axis machines with multithreading controls which are fitted to modern machining centers by the leading CNC machine tool manufacturers.

SprutCAM is intended for use in all sectors of industrial production, where CNC machines or robots are used for processing material by cutting.

SprutCAM can be used with many types of CNC machines, regardless of their complexity, age, manufacturer, CNC type or capacity.

SprutCAM allows the creation of NC code for making punches, molds/dies, model prototypes, master-models, machine and jig & fixture, one off's, patterns; engraving of inscriptions and images.

SprutCAM is used both by large companies with many CNC machines, and also small companies, using only one or two CNC machines.

CERTIFIED Solution Partner
3S SOLIDWORKS

Windows Compatible

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