

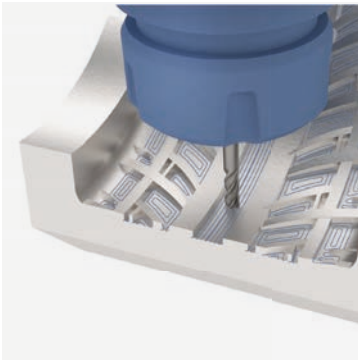


**ModuleWorks**

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# 5-Axis Component

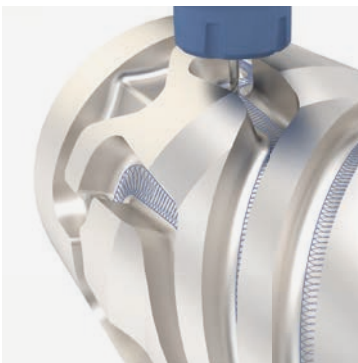
*The 5-axis components offer high programming flexibility for roughing and finishing toolpath cycles for a vast diversity of parts, from generic toolpath patterns on surfaces and meshes to part-specific tailored applications for maximum automation and safety. Everything is delivered in a fully comprehensive object-oriented API that enables fast and easy integration into a host application. A basic-, standard- and professional package optimize the value of your portfolio. Dedicated part-specific training, numerous examples and hands-on applications help you get the best return on your investment.*



Tire Machining

## Key Benefits

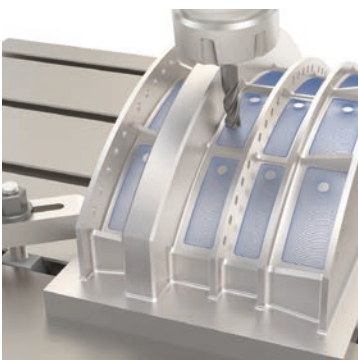
- State-of-the-art technology
- Proven in day-to-day use with 10,000s of customers
- Reduced time to market
- Cost-effective implementation



Spiral Mandrel Manifold

## General Features

- Tool types – barrel, ball, radius & flat tip
- Shaft: straight, tapered or undercut
- Holder: input as mesh or revolved profile
- Machining surface input: meshes, NURBS surfaces/curves, DXF
- Output – CL-Style toolpath or machine angles
- Machine-type output for table/table, table/head, head/head



Multiaxis Machining

## Machining Highlights

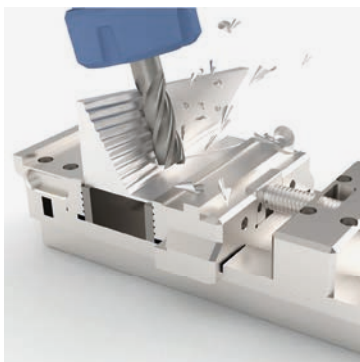
- NURBS surfaces/curve, meshes
- Geodesic pattern generation
- SWARF machining for flank milling
- Automatic holder collision checking
- 4-axis rotary cycles for roughing and finishing
- Strategies for port, blisk and impeller
- Barrel tool support

## Fact Sheet: 5-Axis Component

### Basic package

This package is for users who need basic functionality or who are new to 5-axis machining. The toolpath cycles are easy-to-use applications with minimum user input, automatic tool axis control and collision avoidance. The package is suitable for trimming and drill jobs, 5-axis finishing for M&D parts as well as flank milling of 5-axis pockets. The package includes:

- SWARF, contouring, deburring
- Drilling
- Autotilt 3 to 5



SWARF

#### SWARF

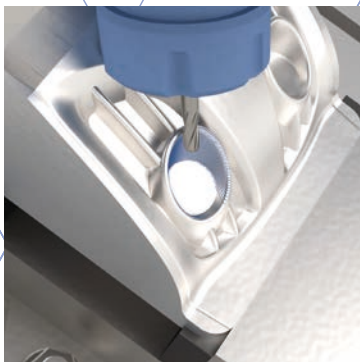
SWARF (Side Wall Axial Relief Feed) machining, or also called „flank milling“, is a 5-axis simultaneous milling process. It is used for machining fluid parts for turbo-engines or aeronautical parts such as integral elements. The target surface is produced with only one cut, using the whole flute length of the tool.



Deburring

#### Deburring

This deburring module creates toolpaths on the outer edges of a part's geometry. The position of the tool relative to the edge is always the bi-vector between the two surfaces of that edge. The system includes automatic feature detection, automatic linking, automatic lead-in and automatic collision avoidance. After selecting the part geometry, the toolpath is created fully automatically.



5-Axis Machining of a Mold

#### Autotilt 3 to 5

This option converts a 3-axis input toolpath to a fully automatic collision-checked 5-axis toolpath. The 3-axis toolpath is used with a much shorter tool. Automatic tilting compensates the holder with the geometry and tilts it away.

## Standard package

This package enables you to use all generic 4- and 5-axis applications. Any part can be programmed, and both roughing- and finishing cycles are available. The user has manual control over the pattern, tool axis, linking and collision avoidance. Any part can be machined. The package includes:

- Surface-/geodesic-/wireframe pattern generator
- Multi-axis roughing
- Rotary roughing-/finishing and turn mill
- Toolpath conversion

## Generic Pattern Generator

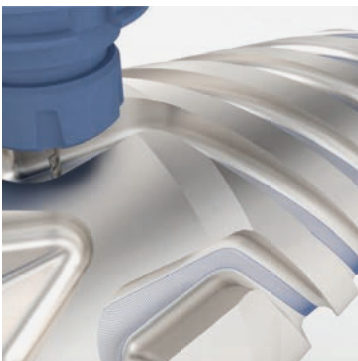
This pattern generator works on surfaces and meshes. Because of its calculation speed and accuracy, surface-based machining is used to create small tolerance toolpaths that can be used for 5-axis production machining as well as optics machining. Mesh-based machining is optimal for creating overall finishing toolpaths on complex geometries due to its robustness and ability to calculate constant stepovers on complex shapes.



5-Axis Profiling



5-Axis Roughing



4-Axis Machining

## Multi-axis Roughing

This cycle creates a roughing toolpath for 5-axis pockets, i.e. pockets with a curved floor. Both the offset pattern and the adaptive machining pattern are available.

## Rotary Roughing/Finishing and Turn Mill

These components create roughing- and finishing toolpaths for turn mill parts. The turn mill cycle creates a turning-like milling toolpath that generates a turning profile. Because it is a milling process, the system always ensures the tool position is shifted to its optimal engagement point.

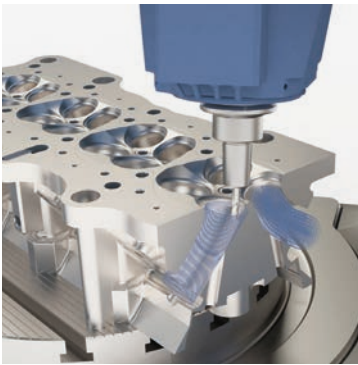
Rotary roughing lets you create roughing toolpaths in the pockets, slots and grooves. It uses the offset pattern technology.

## Fact Sheet: 5-Axis Component

### Professional Package

This package offers the complete range of 5-axis toolpath cycles. In addition to the standard pattern, it offers special applications for port machining and impeller/blisk machining. These applications are dedicated modules for producing these special types of part with automatic roughing and finishing, linking, tool axis control and collision avoidance. Further advanced modules are also available:

- Port
- Multiblade
- 3+2 auto rough
- Mesh tools



Port Machining

#### Port

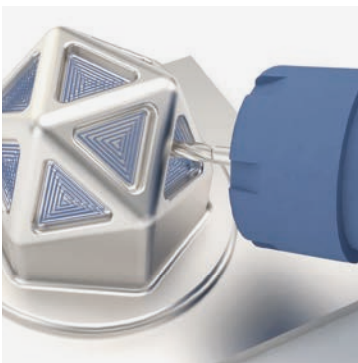
Ports are usually found where fluids need to be transported into or out of machines such as car engines and turbo machinery. Port machining is used to create roughing and finishing toolpaths for port-type geometries. The shape of these ports can be challenging because some areas are very difficult to reach. Port machining makes it easy to reach the full area with a single toolpath, machining from the top and the bottom.



Blisk Machining

#### Multiblade

“Multiblade parts” describes a family of parts. Typical part types are impellers (used for pumps) and bladed disks (so called “blisks”, used in aeroplane engines). These parts are used to compress or transport a fluid or gas. They are very complex and very thin, which makes them difficult to produce. The multiblade package automates the roughing, rest roughing and finishing for the blade and root.



3+2 Roughing

#### 3+2 Auto Rough

The biggest challenges in roughing a part, especially parts with many undercuts, are finding the right directions for positional machining to remove all the material and avoiding potential collisions with the current rest material. 3+2 auto rough combines all of this in a single cycle. The system determines when to machine which rest material from which direction while making sure there are no collisions.

For information on other CAD/CAM components, including 3-axis- and 5-axis toolpaths, visit: [www.moduleworks.com](http://www.moduleworks.com)

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