surfcam

: 4 & 5-axis machining

Extensive Range of 3D Milling Cycles

Surfcam seamlessly integrates 4 & 5-Axis simultaneous machining within its milling and mill/turn environment to allow a wide range of multi-axis cutting strategies to be applied to the most complex tooling or components.

Surfcam brings a wide range of 4 & 5-Axis strategies to solid and surface geometry. The new operational style interface makes programming easy, yet still permits the high degree of control required for demands such as :

• SWARF cutting for machining of variable taper walls

• 5-Axis finishing across multiple surfaces with control over lead/lag and side tilt angles

• 5-Axis profile machining for slotting, de-flashing and trimming of sheet forms

• Full support for all common tool profiles, including lollipop cutters

• Easy-to-use machining strategies are geared to maximize productivity and quality

Transitioning to 5-Axis machining is simplified with the 3 to 5-Axis conversion capability in Surfcam. Plus, Surfcam's machine tool simulator will help you spot areas of concern before the part is on the machine.

Surfcam's 4-Axis strategies are ideal for the rotary machining of automotive and aerospace components such as camshafts, crankshafts and blades, as well as the production of rotary dies and components for the oil & gas industry.

4 & 5-Axis simultaneous machining offer key advantages over conventional indexed 3-Axis machining:

• Reduced cycle time by machining complex components in a single setup. In addition, dimensional accuracy can be significantly improved through the elimination of positioning errors between setups

• Improved surface finish and extended tool life are achieved by orienting the tool to maintain optimum tool-to-part contact at all times

• Improved access to undercuts and deep pockets by tilting the tool or component, which allows shorter tooling to be used and reduces the need for secondary setups

• Less fixturing, as the cutter can be oriented to the component at any required angle

Intuitive, easy-to-use graphical user interface

Ideal for the rotary machining of automotive and aerospace components

Wide range of advanced options providing complete control of the tool

5-Axis modules include full machine simulation to aid visualization of the machining process
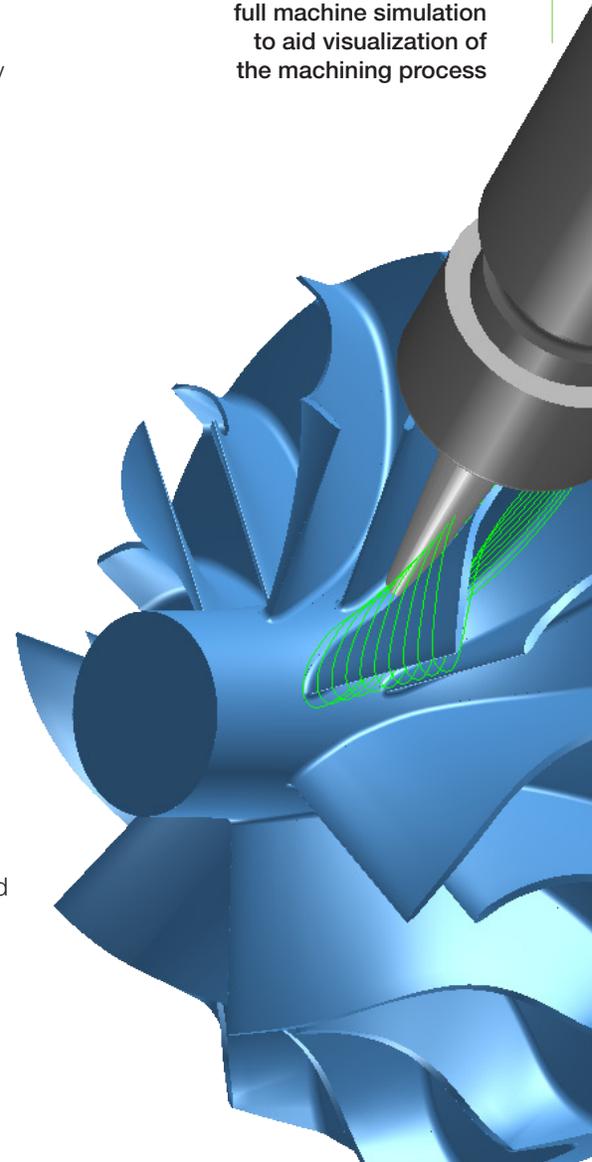
5-Axis machining is now commonplace in all areas of manufacturing, as high-tech machines have become more affordable and design demands have required more complicated toolpaths.
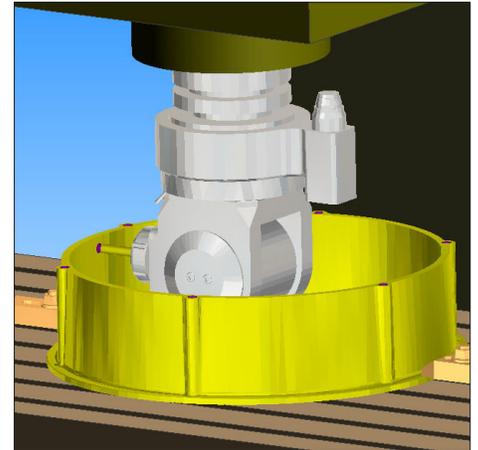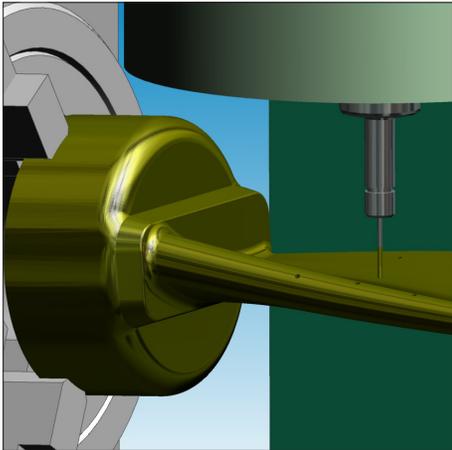
3 to 5-Axis Toolpath Conversion

3-Axis machining operations can be applied to a component and then converted into a 5-Axis toolpath. This conversion produces 5-Axis movement where required, ensuring that tool lengths are kept to a minimum and the cutting tool and holder are positioned away from the component to avoid collisions.

Turn Milling

The 4-Axis rotary attachment on a milling machine can be used to produce a turned shaft using milling cutters. This process relies on the accurate engagement of the milling cutter while rotating the Component. Surfcam's speed and accuracy coupled with an intuitive interface allows even the most complex Turn Milling or cam project easy to complete.

Five Axis Finishing

5-Axis finishing across multiple faces is key to final part quality. Surfcam's five axis finishing can control the tilt of the tool relative to the part surface. This control allows for increased speed, and surface finish. This enhanced control can be applied to a single surface or any number finish surfaces.

SWARF Milling

Side Wall Axial Relief Feed. This toolpath is typically used to drive the side of the tool along a tilting surface. Surfcam allows infinite control over this type of cut that is commonly used in aerospace parts. Surfcam offers granular control over the tilt of the cutter from the surface face. Additional control can be applied thru the use of a bounding curve or control surface.

5-Axis Curve

The 5-Axis curve option controls a cutter's single pass along a curve, with the tool axis parallel to the drive surface. This technique is very useful for de-flashing.

5-Axis Bend Between

An ideal method for machining fillet surfaces where a cut needs to start parallel to one curve but finish parallel to another.

Advanced 4 & 5-Axis Milling

The advanced 5-Axis module provides total control of 4 and 5-Axis toolpaths using solids, surfaces or wireframe geometries. Advance 5-Axis has additional functionality beyond the standard 5-Axis and is ideal for more complicated components such as, blisks and port machining where toolpath plus entry and exit path control is of a very high importance.

5-Axis Positioning

5-Axis machines are also capable of 5-Axis positioning, also called 3+2, where the component can be positioned using a combination of 3-Axis linear movement with 2-Axis rotary movement. A standard 3-Axis machining method can then be applied to the component face oriented towards the spindle. These toolpaths may also take advantage of the 3 to 5-Axis conversion feature.

Toolpath Control

5-Axis toolpath repositioning can result in large movements of the machine tool from one area of a component to another. These repositioning movements could cause severe damage to both the part and machine. Surfcam provides industry leading methods for collision avoidance. Both the cutter and holder are constantly checked for collisions, and the necessary corrections applied to move away from any potential collision.

Inverse Time is a toolpath feed rate control implemented to ensure that the feed rate at the cutting tip is controlled when small movements of the cutter produce a large movement of the machine tool. Inverse time feed rate control allows a specified length of tool motion over a specified time. This ensures that the tool tip motion is correct and that the machine tool movement will compensate accordingly.

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