# ESPRIT SolidTurn

SolidTurn® is a suite of turning and part handling cycles available for use on any class of CNC lathe, mill, or millturn machine. Use ESPRIT's Modeless Programming to combine turning cycles with any of ESPRIT's other machining and inspection cycles to create one complete process with machine-optimized, edit-free G-code. As a full-spectrum solution, SolidTurn quickly produces efficient rough and finish toolpaths for a wide variety of workpieces and machining situations. To support unique requirements for specific parts and materials, ESPRIT offers extensive user control of individual cutter movements. These stock-aware machining cycles consider the remaining stock, tool assembly, workholding, and the complete virtual machine to assure an optimized and collision-free toolpath.
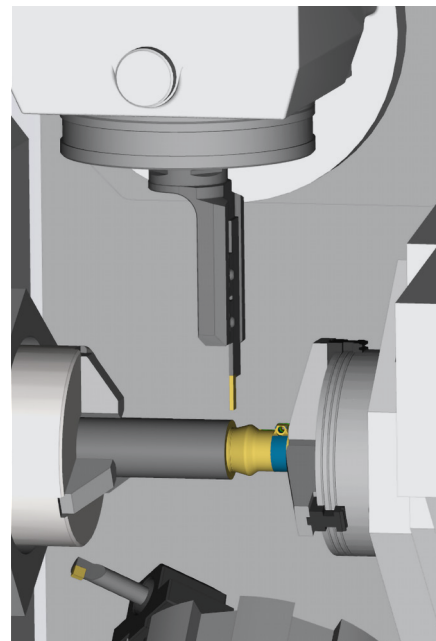
# SolidTurn

## A Full-Spectrum Solution

Use the SolidTurn machining cycles on any CNC machine capable of turning, including traditional lathes with horizontal or vertical spindles, and milling machines with turning capability. For turning centers, ESPRIT supports live tooling, part handling and highly specialized configurations such as spindles with turning axes mounted anywhere on the machine. ESPRIT offers a natural workflow for programming, optimization, and simulation of a full suite of traditional turning cycles, followed with seamless output of machine-optimized G-code. Beyond the traditional cycles, ESPRIT offers optional support for:

- Multiple spindles with pickup and release cycles for front and back work
- Multiturret, multichannel synchronized machining
- Millturn and multitasking for up to 5-axis simultaneous milling
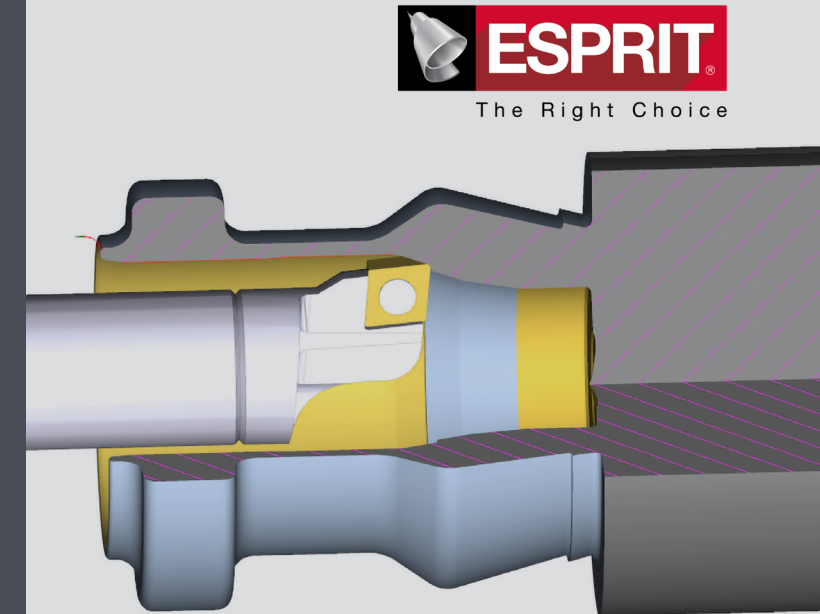- Steady rests and support devices
- Collinear axes

## Simplicity and Control

ESPRIT sets itself apart with a unique blend of automation and user control, resulting in quick, easy programming while also giving complete control over the machining process. Adjust any aspect of the machine's movements, including automatically calculated approach and retract links, entry and exit control for entering and leaving the material, and stock allowances that may vary along the workpiece surfaces to allow for finish machining. ESPRIT automatically trims the toolpath to the remaining stock, eliminating air cutting and minimizing cycle times.

## ProfitTurning®

For high-speed rough turning and grooving, ESPRIT offers ProfitTurning, an innovative cutting cycle that allows significantly higher cutting speeds over traditional turning methods. ProfitTurning uses an algorithm that closely manages cutter engagement, producing a toolpath that has consistent chip loads and cutting forces, less vibration, and lower residual stresses on the part, making it particularly useful for thin walls or hard materials such as superalloys. ProfitTurning increases machine productivity and lengthens tool life:

- 25% reduction in cycle time
- 300% increase in tool life

## Contour Turning

ESPRIT offers a contouring cycle for profile cutting, facing, and OD or ID turning. This universal machining cycle drives single-point tools for a wide variety of roughing and finishing tasks. With the contouring cycle, machine the entire profile in one continuous pass, with or without undercut areas. Alternately, use different cutting directions or strategies for varying faces and diameters of the workpiece. When working with 3D geometry, the feature may be in any plane that intersects the turning axis, eliminating the need to manipulate geometry.

## Roughing

SolidTurn includes a powerful set of roughing cycles that are quick and easy for standard work and are also packed with flexibility and control for demanding applications. Choose from six roughing patterns and three depth-of-cut (DOC) strategies to optimize cycle times for the part material, geometry, and machining objectives. Use a constant DOC for consistent cutting forces through the cycle and the ability to use optimal cutting speeds for minimum cycle time. A variable DOC allows the roughing cycle to produce a constant stock allowance on all diameters of the workpiece for optimal finishing. Alternately, a decreasing DOC minimizes part deflection on delicate parts as the stock material is removed.

## Grooving and Threading

For roughing and finishing grooves on the OD, face, and ID of the workpiece, ESPRIT offers simplicity in programming with comprehensive tool control, and the flexibility to choose from four roughing patterns and two finish techniques. Options for threading include single or multi-point, with straight or tapered threads, and constant or variable leads. ESPRIT automatically calculates the depth and number of cuts using a database of industry-standard threads, all with a manual override option.

## Holemaking

ESPRIT's suite of holemaking cycles produce a wide variety of hole styles—blind, thru, interrupted, deep, threaded, countersink, counterbore, and more. With the option of using a spinning tool, a spinning workpiece, or both, these holemaking cycles are suitable for use on either a mill or a lathe. Working from a hole feature containing a set of properties that define the hole style and its geometric shape, ESPRIT's hole making cycles quickly produce toolpaths optimized for a minimal cycle time for any number of holes in any orientation.
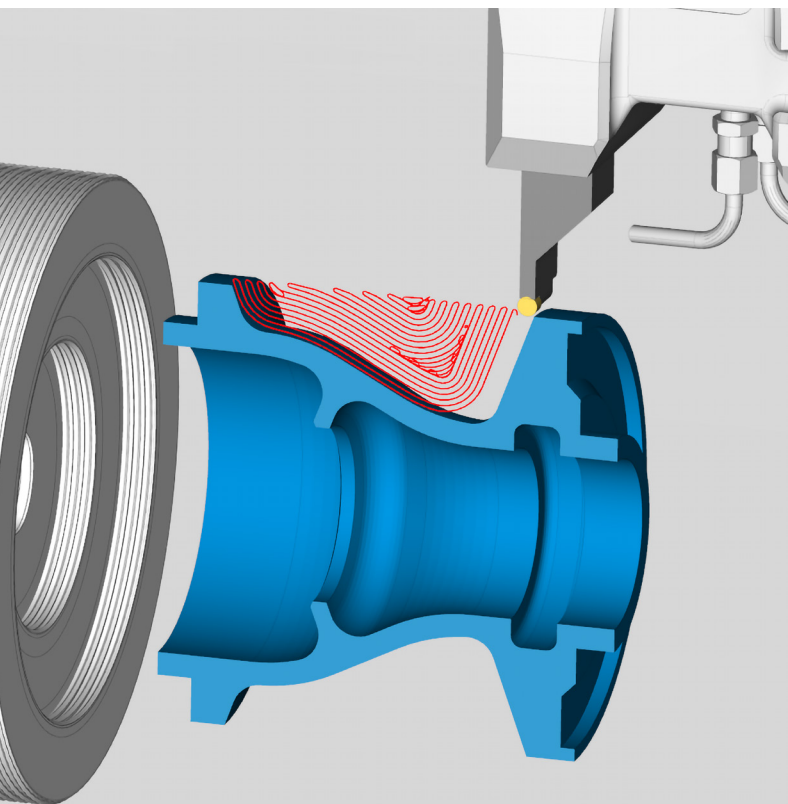
## Part Handling and Stock Support

ESPRIT includes part handling and stock support cycles to program the complete on-machine process, from stock to finished part. Part handling cycles include support for bar feeders, sub spindle pickups, workpiece cutoff, and part catchers. SolidTurn offers optional cycles for tailstock positioning and engagement timing, and steady rest positioning and clamping. Use these cycles at any point in the program in combination with any other ESPRIT milling, turning, or inspection cycles. Machine-aware programming for part handling and stock support includes collision avoidance, accurate simulation for process verification, and machine-optimized G-code output.

# SolidTurn

**Roughing:** multiple passes at incremental depths for rough turning and facing, from regularly or irregularly shaped stock with the option of a finish pass

**Grooving:** on the OD, ID or face of a part, with rough passes, finish passes, or both. The entire operation uses the same cutting tool

**Contouring:** an all-in-one facing, ID turning, and OD turning cycle

**Drilling:** using a spinning tool, a spinning workpiece, or both

**Threading:** Single- or multi-point threading of straight, tapered, constant, and variable lead threads

**Cutoff:** removal of a workpiece from the machine or the transfer of the workpiece to a second spindle. Part catchers are also supported

**Manual Turning:** Creates a turning operation along manually selected Z,X positions using rapid or feed as needed

**Pickup:** transfer a workpiece from one spindle to another, or to hold a workpiece in both spindles for added support

**Bar Feeder:** with or without a stopper tool, or use a second spindle or turret to pull the bar forward

**Release:** for a part transfer or to release a part at the end of machining

**Tailstock, Steady Rest:** Positioning and engagement control

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## High-Performance CNC Programming

Using the ESPRIT Digital Machine - Machine skin models, controller emulators, machine parameters and universal post processors - ESPRIT delivers powerful programming, accurate simulation and machine-optimized G-code. The ESPRIT solution is backed by world-class technical support to get started quickly and keep running at top efficiency.