



T-FLEX CAM

is a fully integrated manufacturing add-on to T-FLEX CAD for generating NC programs as well as toolpath verification and machine simulation with material removal. It provides comprehensive machining tools for a broad spectrum of manufacturing sectors.

System for a Full Range of Machine Tool Applications

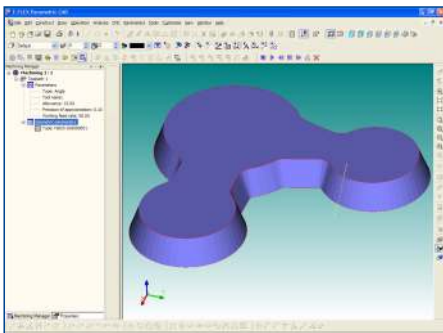
T-FLEX CAM offers solutions for NC programmers involved in milling, drilling, turning, punching, wire EDM, laser and plasma cutting. In combination with T-FLEX CAD, T-FLEX CAM provides fully associative, integrated tools for product design and NC. T-FLEX CAM uses the same T-FLEX CAD geometry to generate toolpaths to ensure the part you machine is the same part you have modeled. Toolpath and machine simulation and verification in T-FLEX CAM help manufacturing engineers quickly improve NC program quality and machine efficiency. With T-FLEX CAD data import and design tools that are fully associative with NC, companies can reduce design-to-manufacturing turnaround times and quickly adjust to design changes. T-FLEX CAM also offers postprocessing, tool editors and industry-specific machining solutions that automate interrelated tasks in the manufacturing process. T-FLEX CAM is available in a variety of configurations, so you can purchase exactly what you need now and add to your system as your business grows.

Parametric CAD/CAM integration

T-FLEX CAM allows manufacturing engineers to take a more central role in providing design feedback, while allowing associative NC toolpath creation to proceed concurrently with design. Because of T-FLEX CAM's ability to maintain complete associativity and synchronization with the 3D product model the manufacturing information can be updated directly from the design data. Process definition and NC programming can begin sooner and design changes are much easier to accommodate. The result is increased productivity and improved quality.

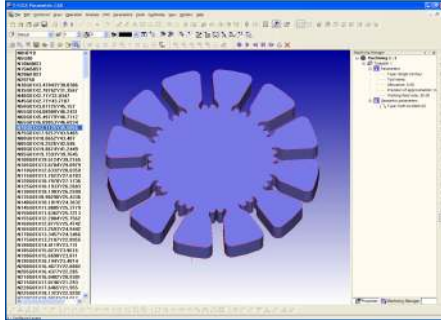
Fully associative geometry and toolpaths let you modify the geometry or machining parameters and immediately get an accurate, updated toolpath. With the single-window integration of T-FLEX CAM in T-FLEX CAD, all machining operations are defined, calculated and verified without leaving the T-FLEX CAD environment. All 2D and 3D geometries used for machining are fully associative to the parametric T-FLEX CAD design model. When the geometry used to define a machining operation is changed in a T-FLEX CAD design, T-FLEX CAM enables the user to automatically synchronize all machining operations with the updated geometry. Associativity is provided between the T-FLEX CAD model and T-FLEX CAM machining in all machining operations.

Wire EDM



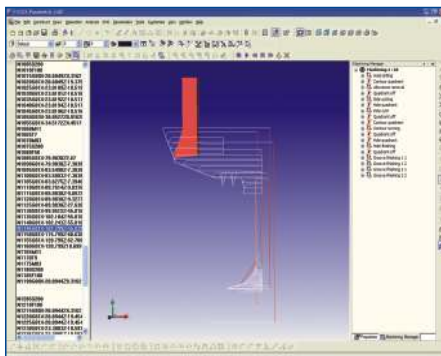
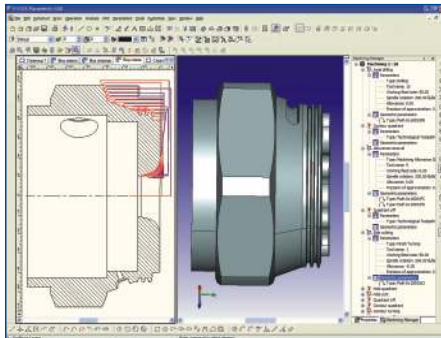
T-FLEX CAM provides a universal EDM

mechanism to machine any contoured mold, die, core, cavity, shape or profile. This versatile machining mechanism supports straight or tapered rough and skim cuts while optimizing wire cutting paths. Fully associative geometry and wire paths let you modify geometry or machining parameters and immediately get an accurate, updated wire path. T-FLEX CAM supports 2D, 2.5D, 4D cutting of any complexity with circular interpolation of curves including two-contour machining.



The same features can be applied for waterjet, laser or plasma cutting.

Production Turning

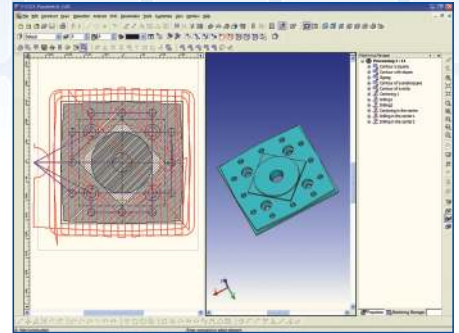


Whether you are looking for a CAM system to automate your traditional turning "from roughing and grooving to threading and finishing" for faster, more accurate results, or to maximize your multi-axis machine tool investment, T-FLEX CAM is the right choice. Its comprehensive suite of universal machining cycles includes support for typical features like grooves and pockets as well as machining strategies for rough, semi-finish and finish turning, together with support for facing, boring, drilling, threading and cut off turning. T-FLEX CAM supports several industry standard canned cycles tuned for various machining centers. User-defined machining cycles can be created in special Editor of Machining Cycles.

Drilling and Hole Making

Drilling, deep-hole drilling, peck drilling, reaming, boring, tapping, and many other point-to-point pre-

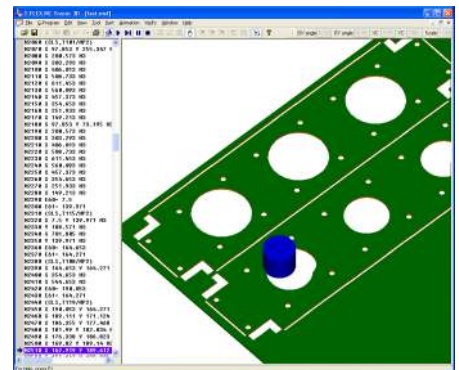
programmed and canned machining cycles are available as well as customizable drilling cycles. T-FLEX CAM's custom machining cycles give you complete control over cutting tool movements to represent your current machining environment.



2.5D Milling/Engraving

T-FLEX CAM's 2.5D milling module enables users to quickly produce toolpaths from T-FLEX CAD drawings data. It includes roughing, finishing, pocketing, pencil tracing, engraving and various specific features like helical groove with helical interpolation support. The pocketing cycle provides full tool control and extensive automation for roughing and finishing pockets of any complexity. The broad variety of pocket machining, finishing patterns, and cutting strategies provided by T-FLEX CAM yields virtually unlimited options for your milling needs. T-FLEX CAM easily engraves any TrueType® font and gives you the effect of classic hand-carved art using your CNC machine.

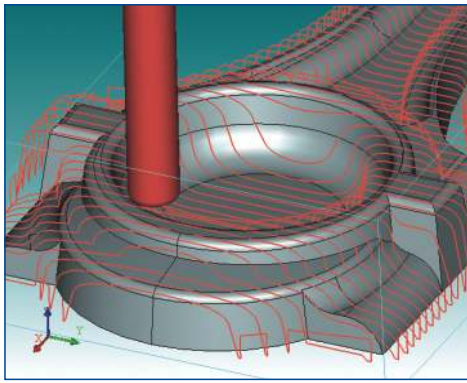
Punching



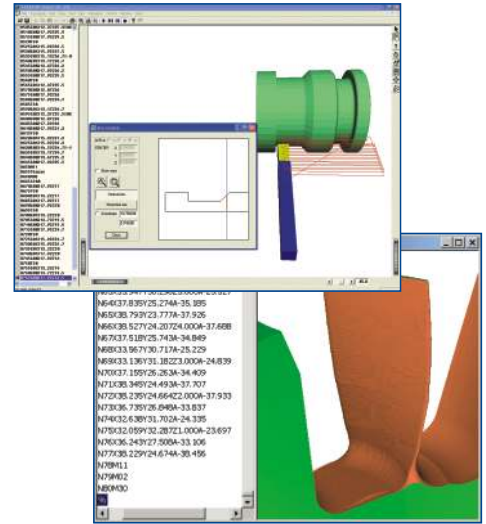
T-FLEX CAM's punching module includes an entire set of commands for interactive insertion and positioning of single tool hits or cycles with full support of micro-joint placement and editing, including support for special tools. When a new tool is created with T-FLEX CAM punching module, the definition includes all of the information necessary to provide the greatest control over tool use. The tool-path can be reviewed at any time with tool-path simulation. Tool hits can be stepped through one at a time, by tool sequence, or full simulation. T-FLEX CAM provides automatic tool-path optimization to minimize CNC machine run-time.

3D Milling

T-FLEX CAM's highly productive 3D milling can be used for both surface and solid models. You can create machining strategies for roughing and finishing multi-surface models using several techniques. You can specify boundaries to limit the cutting region, perform area machining of solid

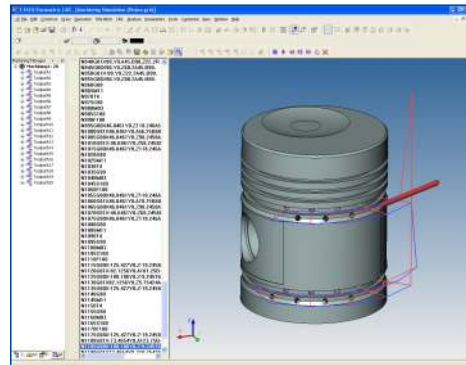


T-FLEX CAM offers both positional and continuous 5-axis machining. Positional machining supports parametric definition of the head orientation in the indexed machining areas. Continuous machining allows the user to create continuous toolpaths across complex surface, solid or triangulated models. The toolpaths are fully gouge checked and support a wide range of machining strategies and all tool types. By using the swarf cutting option optimum machining of complex parts, e.g. impellers, is a simplified process. T-FLEX CAM also allows the user to set variable machining allowances and feed rates in the predefined parametric regions.



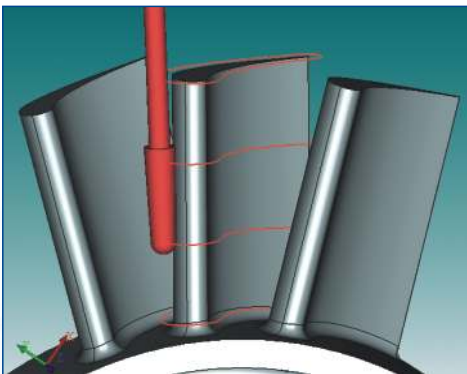
bodies or their cross sections, apply special algorithms for edge/flange finishing, and calculate toolpath for helical circle milling. The program offers support for constant Z-levels and equidistant approaches producing particularly smooth surface finishes. Pencil cutting allows to machine sharp or filleted details even if they have not been filleted. T-FLEX CAM adds an extra level of flexibility to your machining operations working on both smooth mathematically correct geometry and triangulated models.

5D Drilling



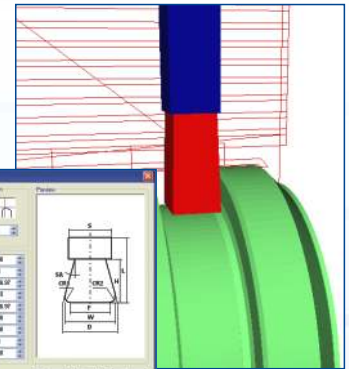
You can detect collisions and errors before the program is loaded on the machine and also optimize your NC program for more efficient machining. The simulation result can be exported as a VRML file for comparison with the real model designed in T-FLEX CAD. The program supports full implementation of forward kinematics and considers geometric offsets of jig and tool.

Advanced 5D Milling

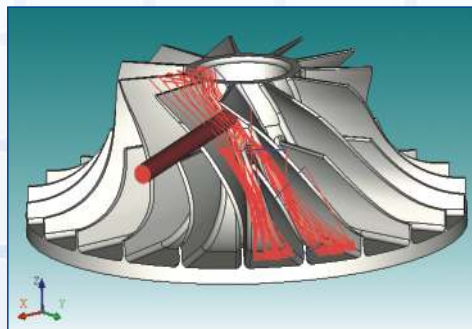
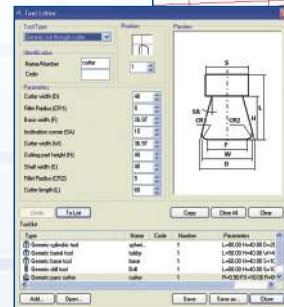
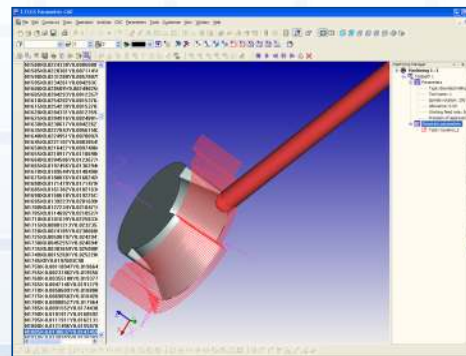


5-axis drilling lets you cut holes approaching the part from any angle. It quickly rotates the tool to line up with the hole, reducing the need to reset the part, producing huge time savings and increasing accuracy and surface finish. T-FLEX CAM supports various machining cycles of 5D drilling, facing, deep-hole drilling, boring and thread tapping.

Flexible Tooling Options



Cam-shaped Milling



T-FLEX CAM provides an industry competitive 5-axis milling capability with comprehensive options of tool positioning relative to a work-piece. Optimal toolpath for complex surfaces is derived based on isoparametric curves or orienting paths. By utilizing this technique, the resulting toolpath is exact and compact as opposed to contoured piecewise linear data that is generally used. Tool axis interpolation is another strategy in T-FLEX CAM's 5-axis machining. It provides capability of generating a gouge-free toolpath. In this case, the tool axis is controlled with multiple vectors, lead angles, or orienting paths.

The special milling of cam-shaped forms is aimed at machining surfaces of revolution or their sectors.

T-FLEX CAM simplifies the tooling definition process and gives you full tooling support, from standard to complex custom form tools for all types of machining. The software features a parametric-based graphical tool editor for interactive definition of tool construction on the base of geometrical and machining parameters that position the cutting point of a tool.

Toolpath generation for complex surfaces with double curvature is also supported on the base of "composite surface" single parametric area for tool orienting.

The concentric cutting passes for this type of machining are oriented orthogonal to the axis of cam rotation. The forming tool movement is defined by cam geometry and corresponds to the pusher motion law of cam mechanism.

Postprocessing Capabilities

NC Simulation and Verification

T-FLEX NC Tracer, T-FLEX CAM's add-on application, provides realistic graphical verification, ensuring that programs are correct before being executed. All types of machining can be verified. The program shows your part being cut from a block of material, optionally imported as a T-FLEX CAD model.

T-FLEX CAM provides a substantial built-in library of postprocessors for all types of machines. The software also includes a postprocessor generator to create and modify table postprocessors to meet the requirements of your equipment. User can specify individual formats and structure of NC program. For complex types of machining you can develop a special postprocessor using direct programming on the base of existing templates provided in source codes.

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