

2.5D DRILLING AND MILLING. FAST, SAFE AND HIGHLY AUTOMATED.



Feature
Design



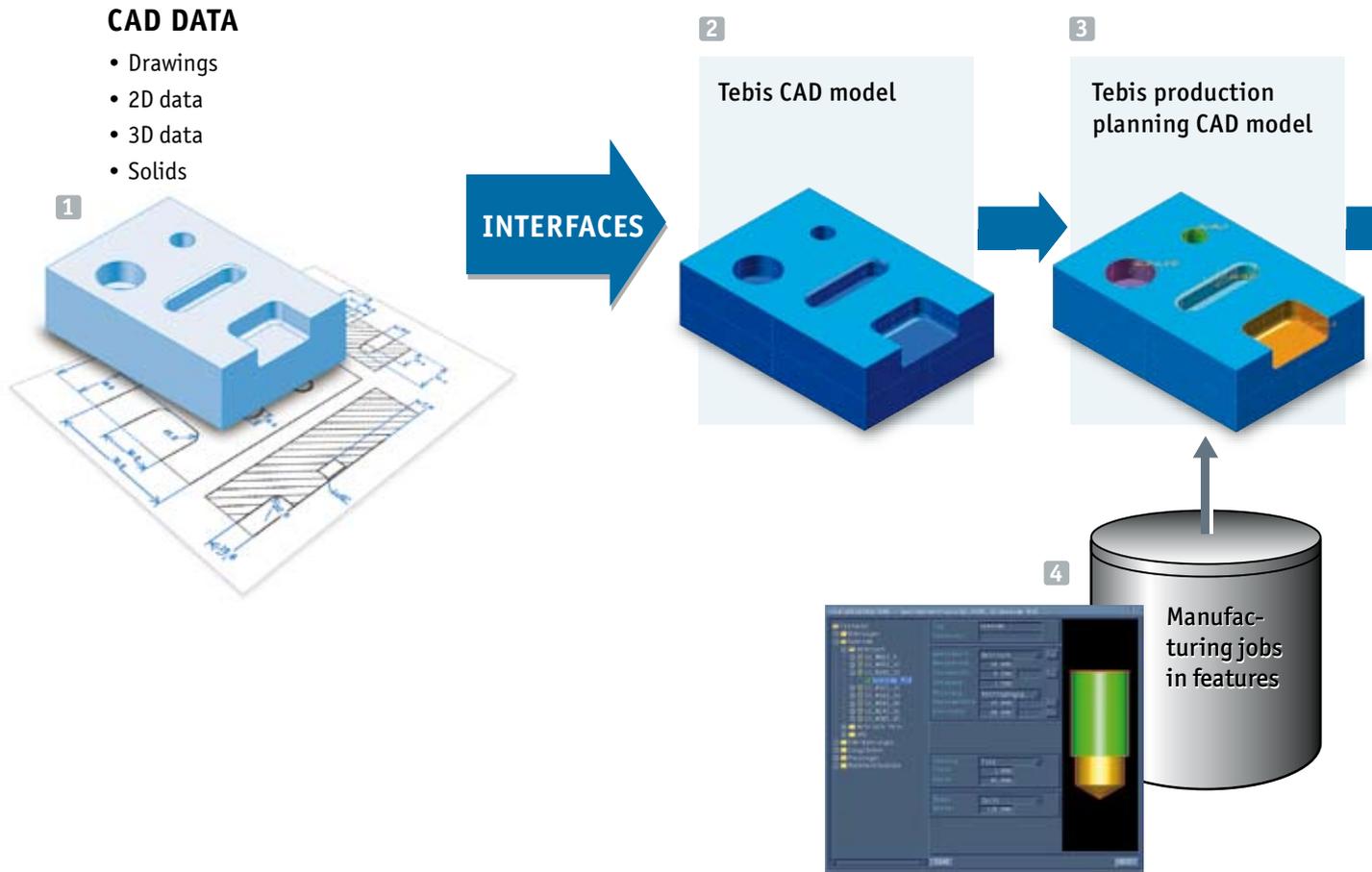
2.5D Drilling
and Milling

Import data, identify features, calculate toolpaths automatically – Tebis CAD/CAM software automates 2.5D machining in die and mold manufacturing, in industrial manufacturing and in other industries. By representing all machining tasks in parametrized features, it enables a high level of automation. And linkage to Tebis AutoMill® NC templates delivers advantages along the entire process chain, from design and NC programming to machine manufacturing.

The benefits of the Tebis solution start right from the design stage, because Tebis copies features from a variety of other CAD systems and evaluates imported CAD geometries. Tebis efficiently identifies all manufacturing objects, thus reducing the amount of drawing work needed. And when it comes to NC programming, information flows automatically from the manufacturing objects into the NC programs.

Tested machining processes are saved in NC templates and are then made available to all users. With just a few clicks of the mouse, you can produce optimized NC programs containing collision-checked tool assemblies, even for complex parts. You'll also save time in production, where your ratio of productive time to non-productive time will steadily improve because your NC controls are no longer used for programming. Errors caused by manually copying data from a drawing into the machine control are completely eliminated thanks to a digital process chain. And even with this high level of automation, users can intervene at any point to optimize the design of their processes.

This is how Tebis 2.5D machining works, with features, NC sets, NC jobs and tool assemblies



1 2.5D machining with Tebis works with any starting data. Whether you're processing drawings, 2D curves, 3D surfaces or solid data, you'll always achieve your goals quickly. The more information and structure in the CAD model (e.g., features), the easier 2.5D programming will be.

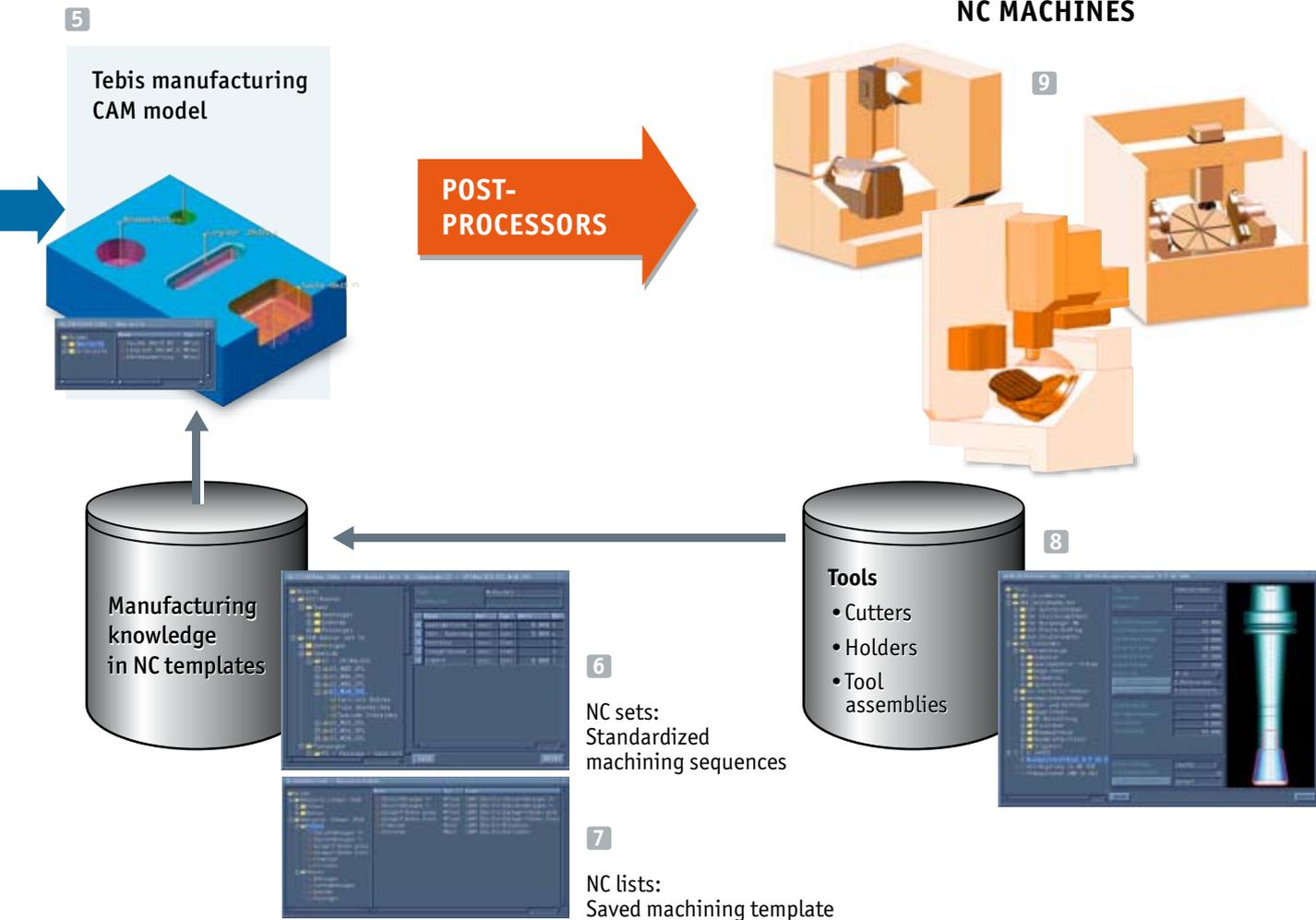
2 If data are not available in Tebis CAD format, they are imported by Tebis through one of the many standard and direct interfaces. In addition to the part geometry, you can also directly copy manufacturing features such as bore holes, fittings and threads from many other CAD systems.

3 The Tebis feature design lets you analyze any geometry data and identify elements for 2.5D machining, such as bore holes or pockets. Tebis sets a feature, thereby documenting the required manufacturing task.

As soon as all the machining objects have been labeled with features, the data set will be ready for automatic NC programming and can manufacture itself if there is a machining sequence for each feature (NC set) (see Item 6).

4 The Tebis feature library helps standardize manufacturing objects, resulting in more efficient NC machining with identical tool sequences, strategies and parameters.

5 The NC programming defines the setups and sequences in which the individual features will be manufactured. NC templates (NC sets and NC jobs) simplify all machining steps that are performed more than once. You can create templates for standard tasks and for similar parts (see Items 6 and 7). All machining steps not defined using templates can also be created manually at any time.



6 The Tebis NC set library contains parametric rules for defined machining steps, such as threaded blind holes, through holes or keyways. Tebis automatically reads the correct positions, orientations and dimensions for executing these machining steps. If no features are present, users can enter these numbers manually.

7 All NC machining steps on a part are saved in NC job lists. They can be organized into folders, allowing you to group setups, machining types, tools and so forth. Since NC job lists can be copied from part to part, they are also well suited for use as templates for certain part classes, such as “punch draw die” or “mold frame”. After assigning this type of template to a part, the user need only define the geometry elements, either globally or selectively.

Individual NC jobs can also be changed, augmented or streamlined as desired. Tebis then calculates the toolpaths for all NC jobs, either automatically or in an interactive dialog with the user.

8 The Tebis tool library manages components such as cutters, cutting material, cutting data, holders, extensions and collets. All components contain contours and information on couplings that may be compiled into tool assemblies that match the actual objects. The NC templates and all NC machining steps access these tools.

9 Tebis postprocessors provide the flexible link between NC programming and the machines. They allow the toolpaths to be exported as NC programs for any controls and machines, so that manufacturing tasks can be easily transferred from one machine to another.

Features are intelligent manufacturing objects

The CAD module for feature design lets you design standardized geometry objects. These features describe manufacturing tasks with geometrical and technological precision. Convenient functions let you place features into the part and adjust them there. In the case of imported part geometries, Tebis automatically identifies areas that can be described by features. The largest benefit is obtained as Tebis features automatically transport values and data all the way up to the NC machine.

Features accelerate design

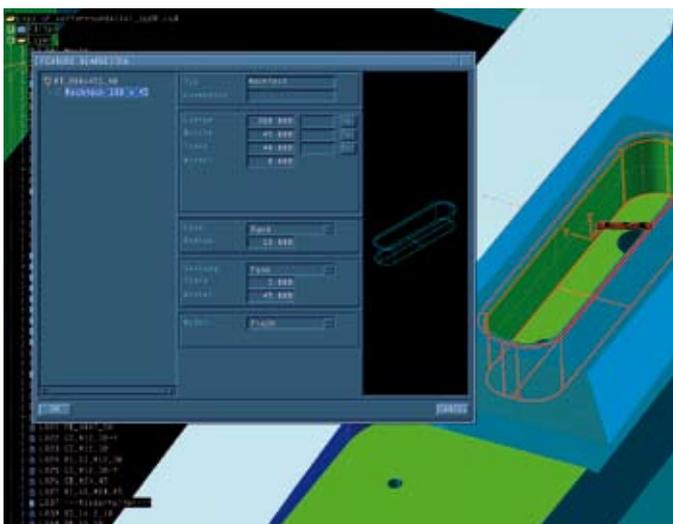
Feature design with Tebis accelerates and simplifies CAD work. You can copy manufacturing information from many other CAD systems in the form of features (see chart), thereby clearly documenting in the CAD model what has to be manufactured. The features contain all geometrical and technological parameters for manufacturing tasks, such as “M10 threaded blind hole, 25 mm deep,” or “25 x 8H7 slot, 5 mm deep”. These data will no longer have to be detailed in drawings for manufacture.

Identifying geometries and placing features

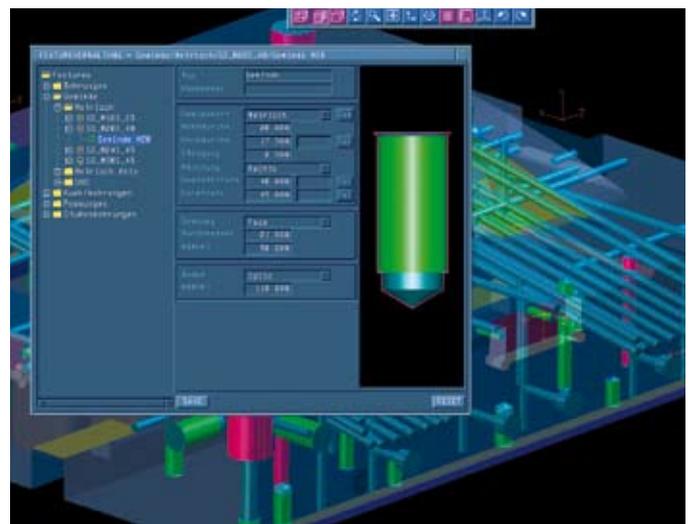
Tebis quickly and reliably detects feature-relevant geometries in imported data and places features there. This also functions with 2D drawing data. And for the convenient design of bore holes and pockets, it's also possible to define coordinates and directions so features can be placed directly. The feature library lets you set defaults and standardize manufacturing objects. This ensures, for example, that your thread core holes will have the same depth allowance or your chamfers the same form. You can then use standardized drilling and milling tools for effective NC programming and NC machining.

Process safety with features

A particular advantage of Tebis features is that numbers and information can be automatically transported all the way up to the NC machine. Thanks to its feature technology, Tebis NC functions copy over all geometry information (positions, directions, diameters, depths, etc.) with just a single click of the mouse. Any errors caused by manually typing the data are thus completely eliminated.



Features can be used to describe a wide range of manufacturing tasks, including threads, fittings, step bores or this slot.



The feature library lets you define all necessary hole geometries with production-relevant information, and manage them in a structured system.

Universal interfaces

Tebis connects you efficiently with features from various manufacturers. With Tebis, you can easily import, edit, and process features from the following formats:

Features from automobile manufacturers

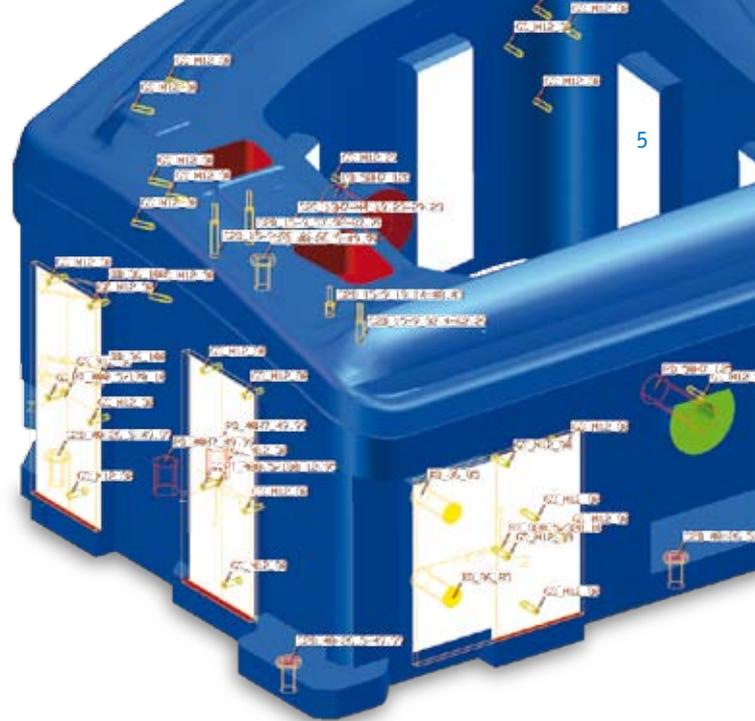
- BMW Info Drill (Catia V5)
- DC Power Features (Catia V5)
- DC Model Manufacturing Features (Catia V5)
- DC Info Drill (Catia V5)
- VW Features (Catia V5)
- Opel Drill (Unigraphics)
- MB Drill (Catia V4)

Features from CAD manufacturers

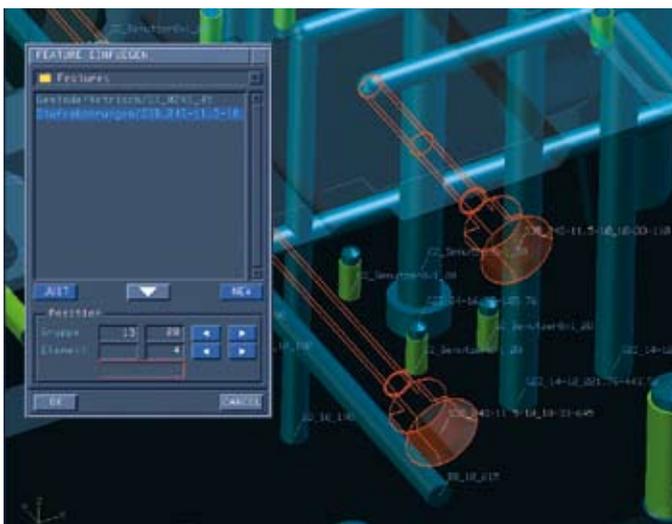
- Catia V5
- Unigraphics
- VAMOS bore tables (Catia V4)

Plug-ins for Tebis features in other systems

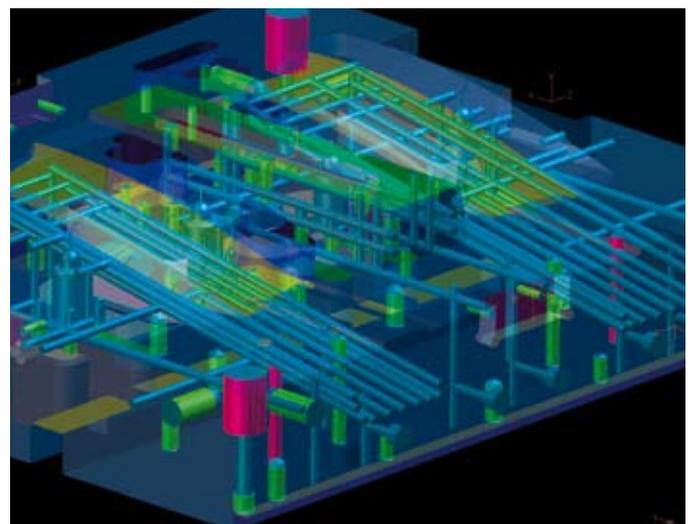
- MoldWare MWF for Catia V5
- MoldWare MTF for Catia V4
- NET/FeatureScanner for ProE



This core of a draw die was imported from a different CAD system. All drilling features were copied over, and Tebis has identified the milling features in the geometry.



The feature scanner has identified a group of water lines and suggests the best choice of elements from the library.



The nozzle side of an injection molding die with more than 170 features, from a simple tap to a multi-stepped water line with a screw connection. Features allow NC programming to be done completely automatically.

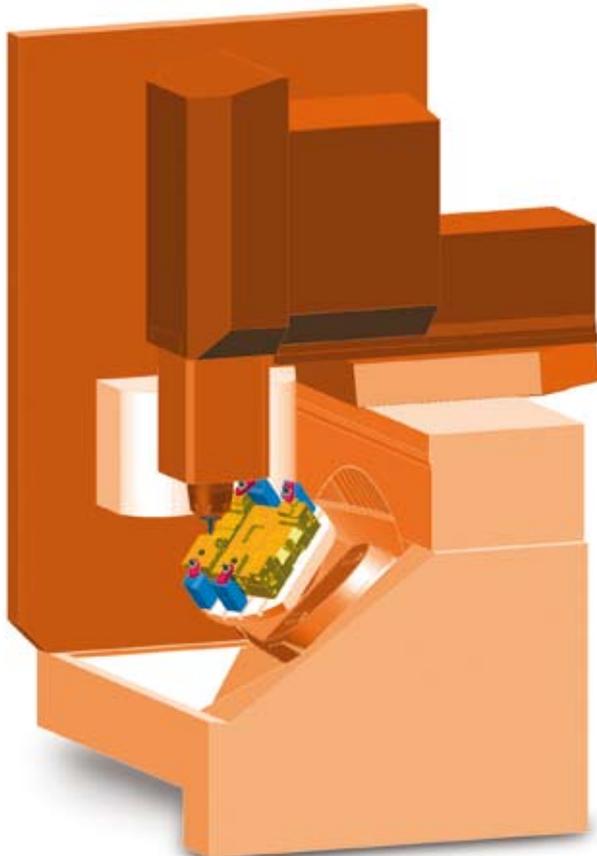
Fully automatic, knowledge-based NC programming

The CAM module for 2.5D drilling and milling processes all types of single, stepped, fitted and threaded bore holes, as well as planar surfaces, pockets and contours. Thanks to its extensive automation options, the software increases productivity and process safety. The link to feature technology, in particular, allows for rapid creation of NC programs from CAD data.

Multifaceted and flexible NC programming

Tebis's many functions provide tremendous flexibility for any kind of drilling and milling processing. Drilling functions allow you to program NC programs for all types of bore holes, threads and fittings. Milling functions enable you to create individual NC programs for pockets and planar surfaces, and for vertical contours and their residual stock machining.

Integrated blank updating efficiently recognizes all areas containing residual stock. It also ensures that tool movements unrelated to the material involve positioning only.



Automated creation of NC programs

Tebis provides multiple options for automating repetitive machining steps in NC programming:

- NC sets are used to define the machining of standard elements that require multiple machining steps in a series. These may be threads, stepped drills or pockets with different roughing and finishing tools.
- NC job lists are used to create templates for entire part classes that are milled using the same machining steps. These may include "draw die attachments" containing machining steps for column guides, base and flank surfaces, key slots and drilling.

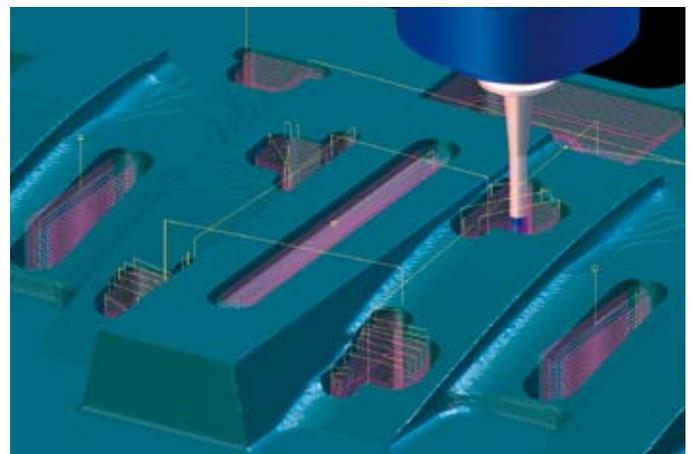
Centralized manufacturing knowledge

With its high degree of standardization, NC set technology offers special advantages for 2.5D NC programming. The system accesses tried-and-tested machining sequences (NC sets) that your milling specialists have already defined. In this way, Tebis manages your manufacturing knowledge. Reliable and tested machining processes are saved to a central location, made available to all employees and protected against unauthorized access by third parties.

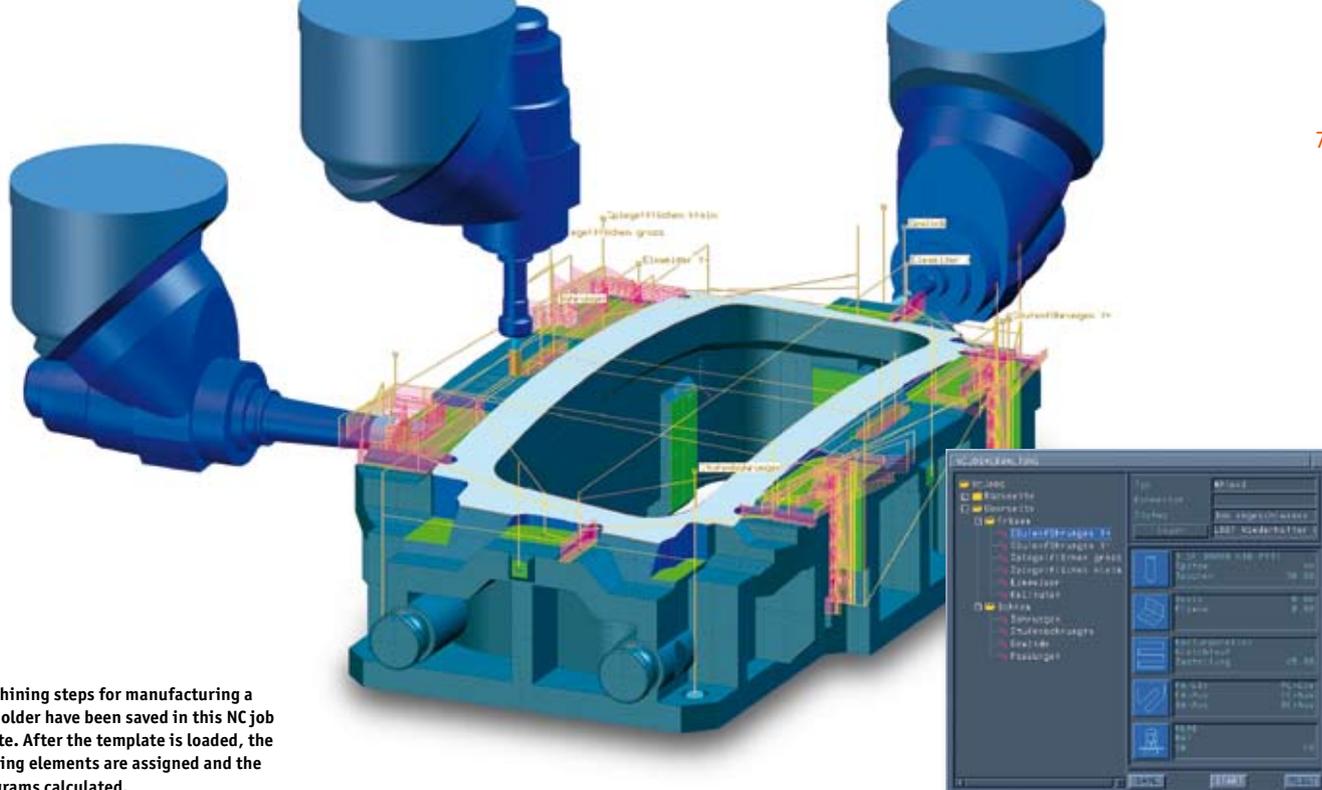
NC sets automate machining sequences

NC sets bundle individual functions for standardized machining sequences, such as roughing and finishing or drilling and thread cutting. These include all necessary tools and the optimum milling parameters.

If the CAD model contains features, NC programming takes place completely automatically: each feature finds the NC set defined for its manufacture. This greatly reduces the effort needed for NC programming work while increasing safety.



NC programming of pockets with blank updating of the roughing blank ensures maximum material involvement and short retracts.



All machining steps for manufacturing a blank holder have been saved in this NC job template. After the template is loaded, the machining elements are assigned and the NC programs calculated.

NC sets save time and increase safety

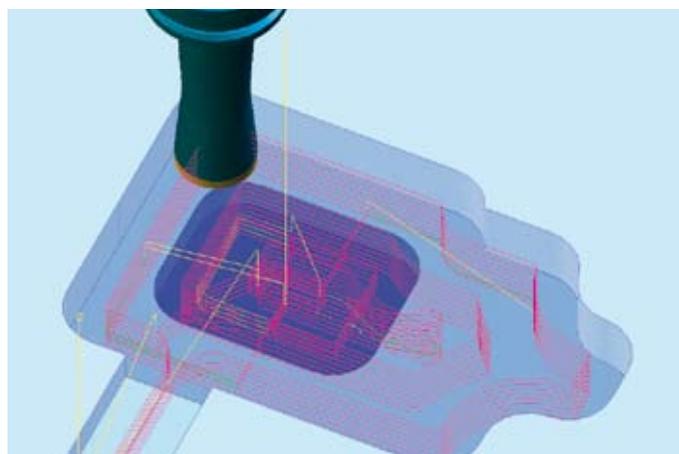
Feature-based NC programming saves time because it allows for your machining sequences to be defined only once and to be recycled afterward without further intervention. Such standardization of manufacturing processes using always the same tools, parameters and strategies also results in faster and safer milling. Automatic transport of your CAD data from the feature to the NC programs eliminates errors that arise from manual data entry, and ensures that no machining tasks are forgotten.

Structured NC processing with NC job lists

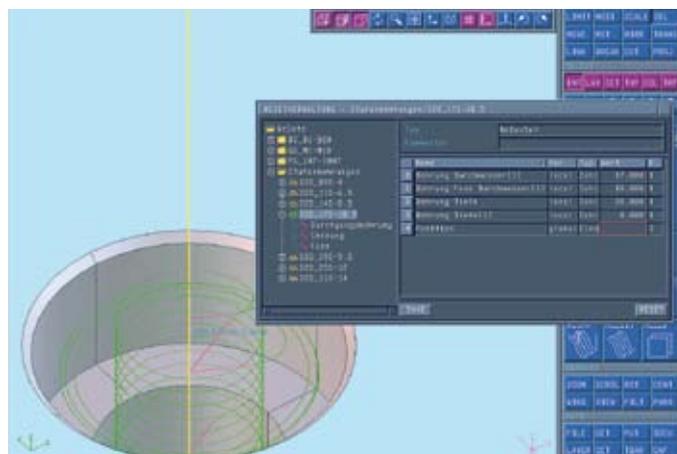
Each NC processing step on each part is saved in one NC job list. This allows for clear documentation and easy retrieval of all machining steps and sequences. NC job lists can be applied from one part to another by simply copying them, thereby turning NC jobs into templates for part groups, such as punch draw die or mold frame. These templates then describe all the manufacturing tasks needed for this type of part.

Automated machining of part classes with NC jobs

Using NC job templates considerably simplifies your NC processing. A template is assigned to a part, the machining and control elements and part-specific parameters are defined, and the system then starts fully automatic calculation of all toolpaths. It's easy to add additional machining steps for the current part to the template, or delete unnecessary machining steps. The sequence can then be re-used for future tasks in the form of a template. This allows you to expand your manufacturing knowledge while ensuring that your processes and strategies have been tested.



Effective milling of a multi-step pocket with a ramp-shaped Z approach (green) and rounded paths enable the highest level of milling performance.

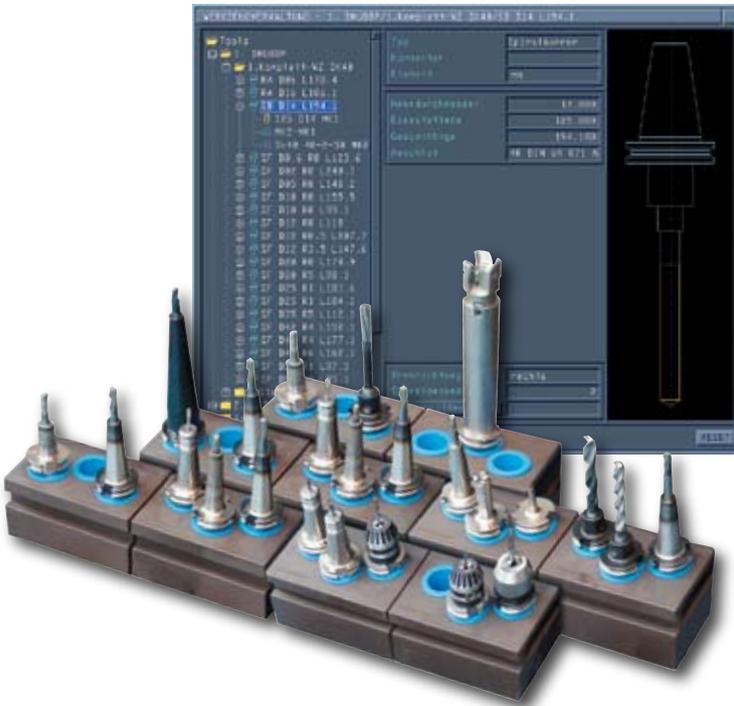


Manufacture an NC set with the three machining steps through hole, counterbore and chamfer for counterbored assembly of a cylinder screw in accordance with Din 912.

Practical tool administration

With Tebis tool administration, components such as the cutters, holders, extensions and collets, as well as tool assemblies, are described with realistic contours.

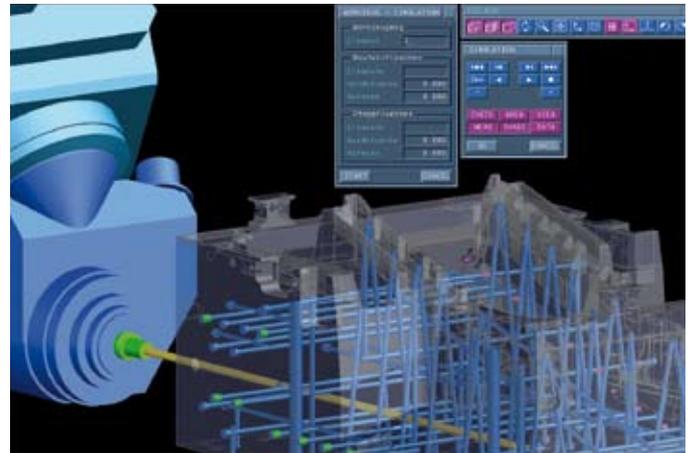
This allows you to realistically calculate collision and generate accurate tool lists containing individual components and extension lengths for the tool setup. It also enables you to copy over tool manufacturers' data through interfaces. With the tool assemblies represented in Tebis, you can determine the right tool in advance. You can also compare the tools available in the CAM model and the tools available on the machine with just a few mouse clicks. Jobs that can't be machined because the right tool is missing become a thing of the past.



The Tebis tool library realistically images the drilling and milling tools used.

Flexibility and efficiency on the shop floor

With its clear and simple format, Tebis is easy to use and appropriate both for the CAM office and the shop floor. Because it separates the 2.5D NC programming from the control, it keeps your machine free of blockages due to programming issues. Tebis allows you to move calculated toolpaths to a machine with a different control by simply performing a postprocessor run. Depending on the postprocessor, you can output the NC control's cycles or linear and circular movements only. This means you can also use machines for challenging 2.5D machining that have controls not intended for that purpose. The collision check with the tool assembly – also available as an option with the complete machine and clamping elements – ensures maximum safety for machine operators.



2.5D programming from Tebis is excellent for complex deep hole drilling in mold manufacturing.

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THE CAD/CAM EXPERTS.