MORE TRIMMING FLEXIBILITY
THANKS TO OFFLINE TECHNOLOGY

5-Axis trimming

With the Tebis CAM module for 5-Axis trimming, you can create 3- to 5-Axis NC programs for trimming in offline mode. In doing so, you will move the teach-in process for your trimming steps from the machine to the virtual world of the CAD/CAM seat thus reducing costs and downtime.

Offline programming has a number of big advantages over the conventional teach-in processes. Your trimming machines' productive time will increase because the downtime caused by teach-in procedures on the component will be completely eliminated. Since toolpaths will be calculated on the basis of CAD data, your NC programs will have considerably greater precision. And the reproducibility and documentation of your toolpaths will be guaranteed. The software's application areas range from trimming vacuum formed plastic parts to machining carbon and glass fiber-reinforced plastic parts and the use of robots for serial production. Tebis supports the machines of all the popular manufacturers.

As in all the Tebis CAM stations, in 5-Axis milling users will also benefit from the tight integration into the Tebis CAD/CAM system landscape: They will always be able to react to any situations that may occur, since any missing curves or surface areas can be simply and easily generated immediately using the Tebis CAD functions, which will prove advantageous in your collision monitoring. But even without CAD surfaces, you will be able to produce trimming programs at the click of a button. This is enabled by our modern vector and constraint technology.

Calculating contour trim programs:
## Automatically or step-by-step in the dialog

To calculate offline trim programs, select the trim curve or lateral support contour. Enter data for the trimming strategy, set the approach and retract macros and define the behavior for cornering and for unwinding after rotational movements of the machine head. From the integrated tool library, select the suitable tool assembly and assign the machine and the material to be cut. Tebis will then calculate the toolpaths. You can select between auto mode or interactive step control.

In the interactive mode, the system will generate step-by-step results that users can either accept or modify. This will allow you to affect the start position and the spatial position of the machine head, not to mention the areas to be trimmed and their machining sequence. Users will thus be able to integrate their own production know-how into the programming.

Semi- and fully automatic collision avoidance

When CAD surfaces are available, while calculating the cutting paths the system will automatically run a collision check that also takes the machine head into consideration.

The collision check can also be expanded to include clamping elements if they have been placed in the CAD model to match their actual location.Tebis automatically identifies risky areas for collisions with the component or other obstacles (such as clamping elements). Users can use the graphic interface to detour around them. The system automatically monitors the machine's kinematic properties such as tilting limits or preferred starting position during toolpath calculations. In the fully automated mode, the system automatically calculates evasion movements for identified collisions.
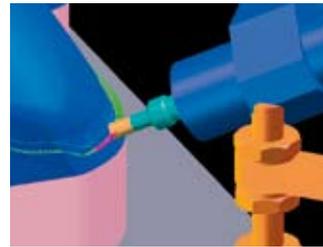
Cutting paths contours can also be subsequently checked for collisions with the machine head and possible obstacles.
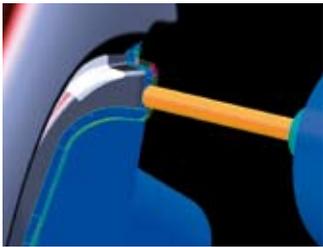
**Users optimize the clip areas of the suggested trim curve.**
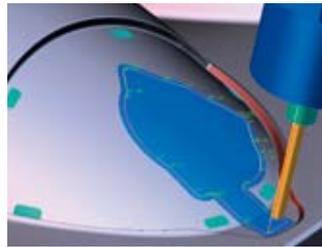
When necessary, the system will produce cutting paths consisting exclusively of line and circle segments.

At the click of a button, the collision check will identify all areas of the cutting curve (red) where the machine head would touch the component or another obstacle .


After changes to the spatial orientation of the machine head, the collision check displays only green vectors.
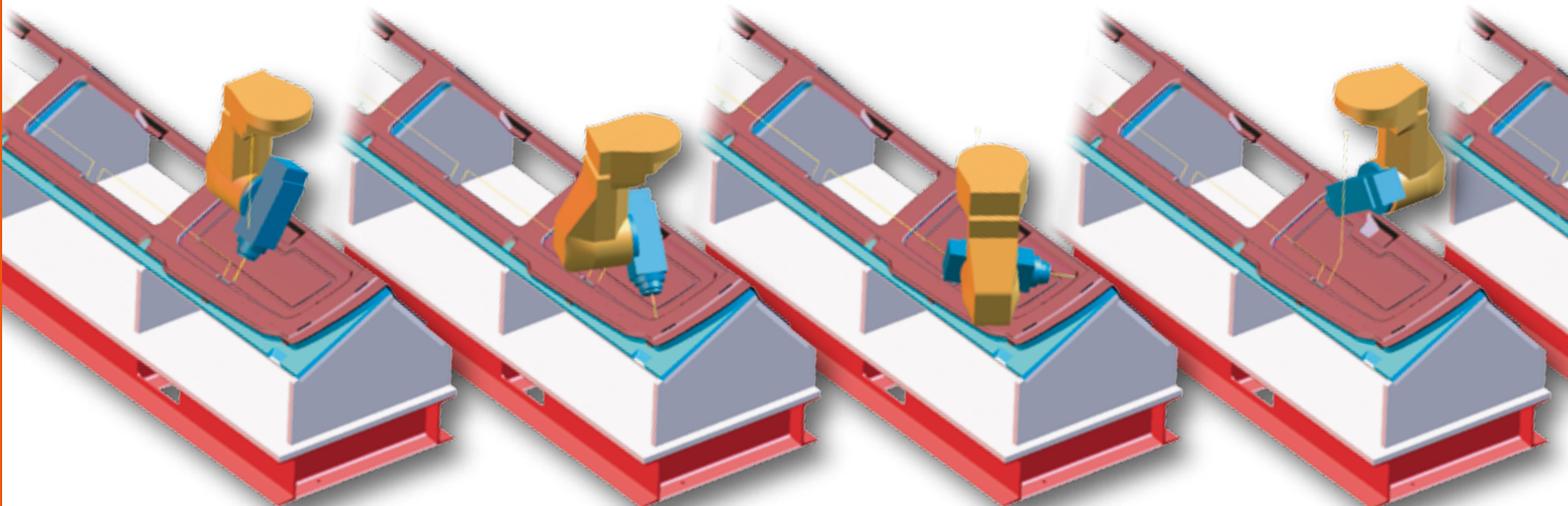
## Machining shape elements separately to save time

When calculating the cutting paths, the system analyzes the cutting curves and identifies regular geometrical standard shape elements (features) such as holes, slots or rectangles with sharp or rounded-off corners. The advantages for you: These geometrical standards will be exported into the NC program during post-processing and enable targeted and rational processing using the NC control's specialized subprogram technology.
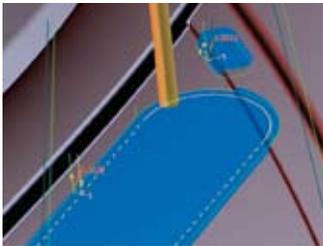
Tebis automatically recognizes shape elements such as circles and slots and labels them as machining features.

Compatible with all the normal data formats

For the Tebis module for 5-Axis trimming, there are CAD interfaces to the usual data formats such as Catia V4, Catia V5, UG, PRO/E, VDA, IGES, DXF and STL.
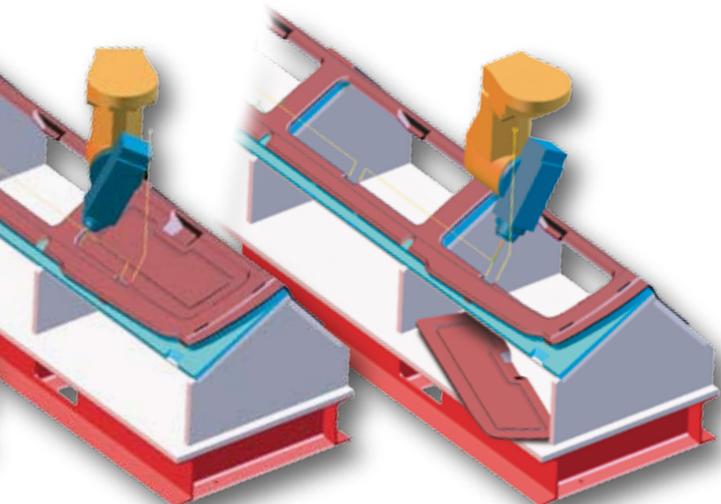
Graphically interactive follow-up treatment of NC paths

Users can comfortably simulate and analyze calculated paths. The system automatically recognizes and graphically highlights areas with major rotational movements of the machine head or high lateral inclination just as it recognizes and highlights areas at risk for collisions. Powerful, graphically interactive functions are available for subsequent processing of the identified path areas. That allows you e.g. to moderate unintended or too dramatic rotational movements of the machine head or eliminate collision hazards caused by other spatial assemblies. You can also make path corrections at any location. This is always necessary when the CAD model deviates from the real component, for example due to slight springback effects on the jigs and fixtures.

Path corrections allow you to reconcile contour deviations between the CAD model and the real component.
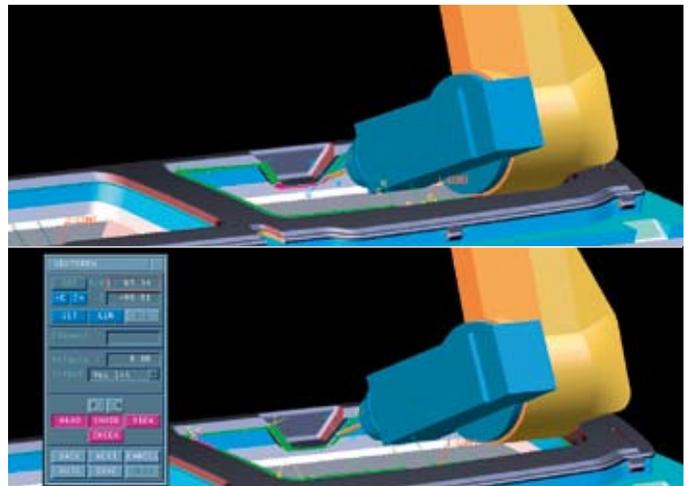

The orientation of the machine head can be easily changed with the mouse. Together with the automatic analysis functions, this lets you define collision-free head orientations.

NC job administration –
for engineering changes and associated tasks

All data entered and modified during the interactive step control, including all the intermediate results from those data, can be saved in the integrated NC job library and subsequently modified from there. The NC job library thus lets you access your development and production statuses at any time. Another advantage: This makes it possible to transfer all NC parameters entered to produce one component to similar components. This reduces your programming work considerably. With these machining templates, you can effortlessly create updated NC programs for engineering changes on components and transfer existing strategies to components with related shapes.

The NC job library's transformation functions let you create mirrored, rotated, moved or scaled copies of a machining step with a few clicks of the mouse. This lets you program and calculate NC programs for multiple cavities and mirrored symmetrical components (left handle/right handle) in the briefest period of time. If machining of a transformation should prove to not be possible due to a machine's kinematic limitations, the user will be alerted and can e.g. individually adjust the machining step by changing the head orientation.
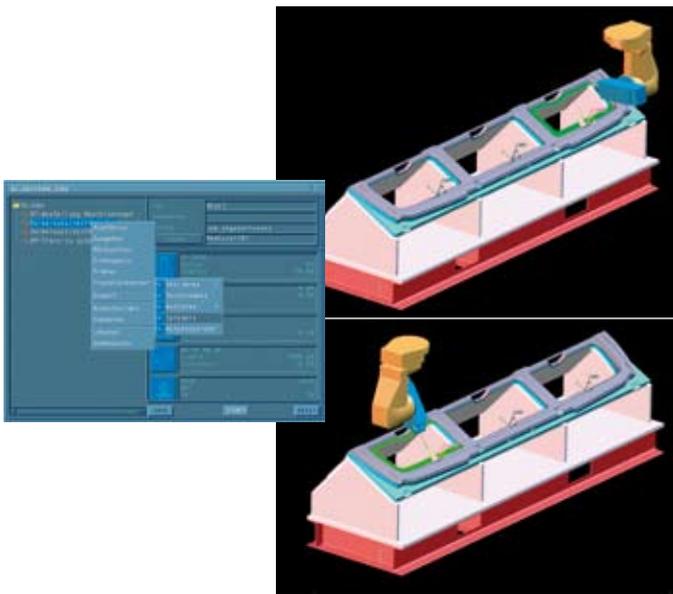

Use the NC job mirroring function to transform optimized machining of the right clip area to the corresponding area on the left side of the component.

Reverse processors simplify revision cycles

In trimming, the cutting path often doesn't match the CAD trim curve, e.g. because the hole pattern has had to be moved. There are many reasons to optimize NC programs at the trim machine by teaching or editing. Such changes can affect the tilt direction of the machine head, the position of the clip areas or the size and location of assembly bore holes, to name a few examples. When extra design changes are made to the CAD model, they will also have to be incorporated into the already optimized NC program. With the Tebis reverse processors, you can re-import NC programs from the NC control and adjust the cutting paths in very few steps to match the changed CAD contour.
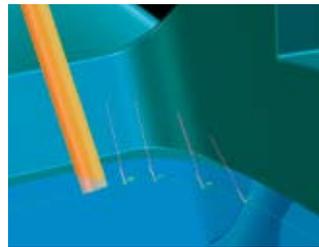
Machine head positions (yellow) are transferred into the NC program and imported into Tebis. The original approach vectors are displayed in red.
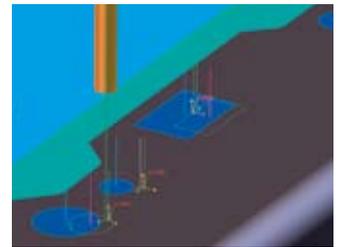
You can also re-import moved positions of shape elements that were defined as a cycle in the NC program.

Switching to different machines

Thanks to Tebis technology, the machining of components is no longer bound to certain specific machines. With the reverse processors, you can also machine jobs for which you have no CAD data on different machines. When switching machines, use the reverse processor to import already generated NC programs and export them as NC programs for a different machine type.

THE CAD/CAM EXPERTS.