



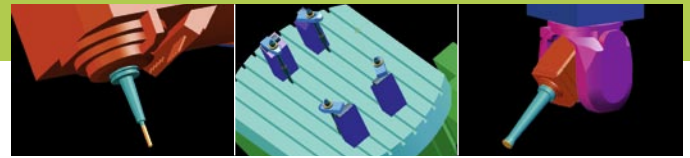
## VIRTUAL MACHINES FOR PLANNING, TESTING AND OPTIMIZATION.



Simulator

The Tebis Simulator brings your workshop to your desktop. You can simulate complete machining processes, even across multiple NC machines. You can run virtual feasibility tests for your production department, provide support for job cost planning and increase process safety with visualization, testing and optimization of your production processes. Thanks to its complete integration into the Tebis CAD/CAM environment, the Tebis Simulator is an important link in your CAD/CAM/NC process chain.

Tebis Simulator saves you time and expense. Not only will you prevent damage to your tools and expensive post-collision repairs to your machines, you will also reduce your running, setup, downtime and documentation time considerably.



The Tebis Simulator accesses a virtual machine library containing detailed views of all NC machines in your own manufacturing department as well as your customer's. In addition to geometric dimensions, the library also stores kinematics conditions such as travel limit switches and travel during tool changes and positioning movements. You can simulate even complex kinematics (5 NC axes + additional axes).

The user is able to simulate the entire manufacturing process on virtual machine tools. Whenever collisions are recognized or when a travel-limit switch is triggered he can easily modify the part setup, edit tool assemblies or exchange a spindle head.\*

**MORE SAFETY, BETTER PLANNING AND GREATER FLEXIBILITY**

The Tebis Simulator demonstrates its advantages along the entire length of the NC process chain

**VERIFY MACHINE INVESTMENTS** (page 3)

- Virtually test machine sizes

**PLAN NC PROGRAMMING** (page 4)

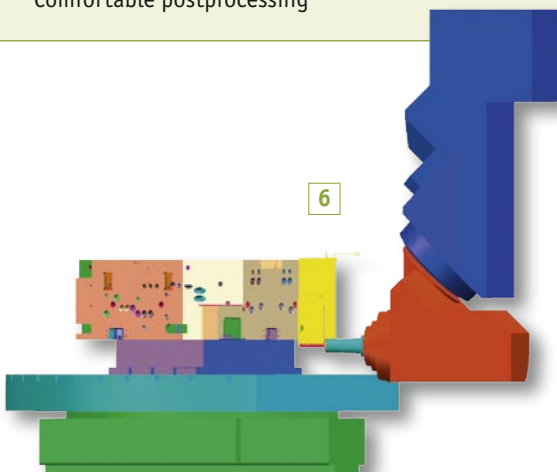
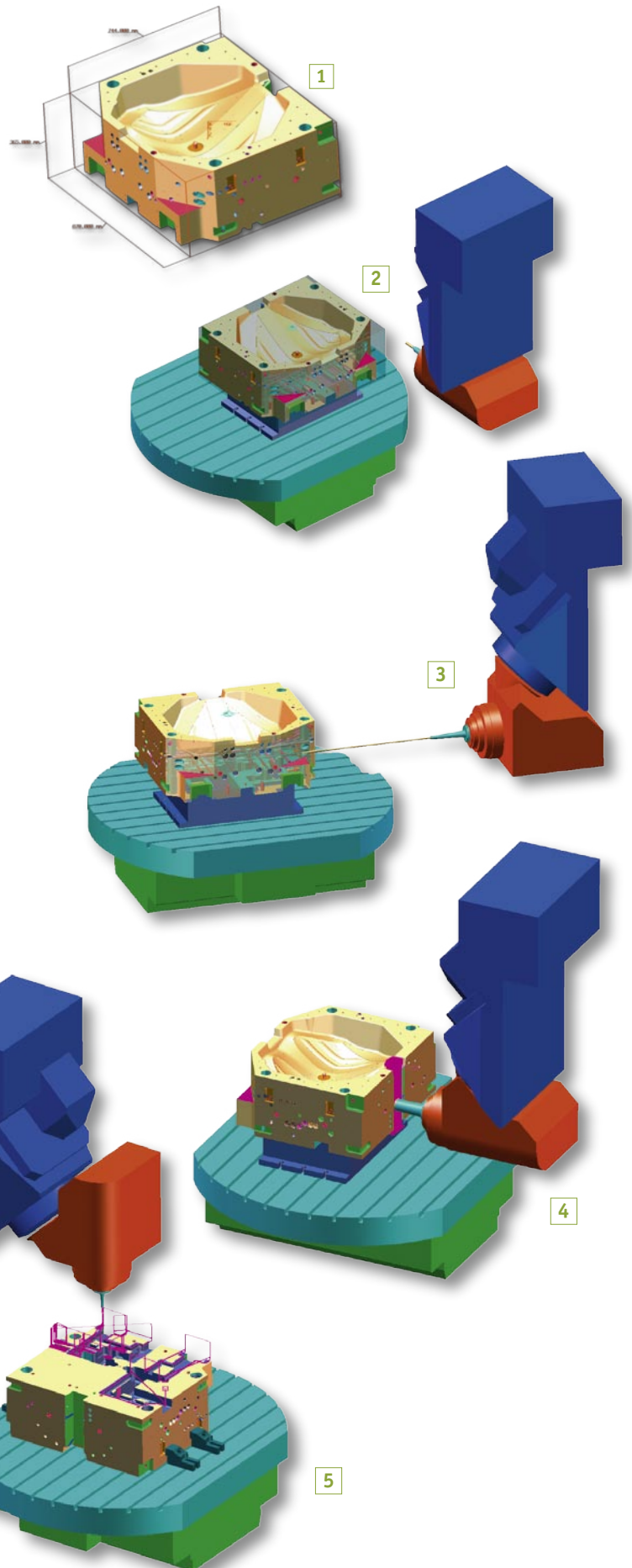
- Plan job costs
- Analyze setup arrangements
- Generate machining axis systems
- Test critical component areas

**MANAGE AND TEST NC PROGRAMS** (page 5)

- Simulate tool paths and test them for collisions
- Fix problems that have been detected
- Document NC processing
- Comfortable postprocessing

**WORKSHOP** (page 7)

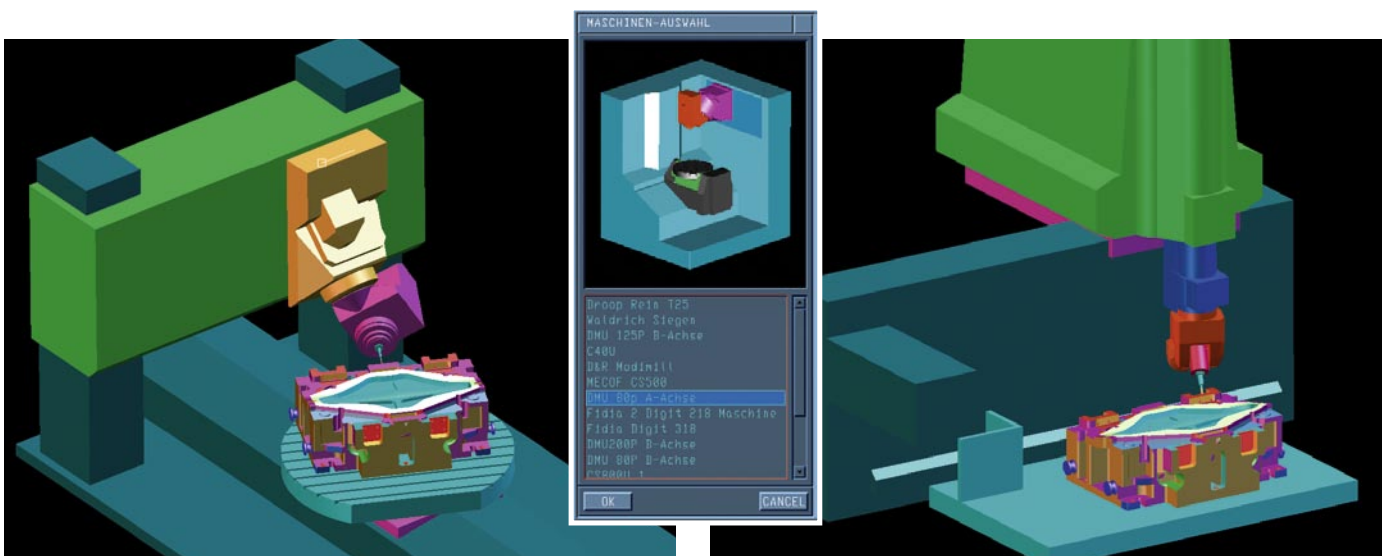
- Simulate the tool paths
- Include your technical manufacturing knowledge
- Fix problems that have been detected
- Switch machines, if necessary
- Comfortable postprocessing



## VERIFY MACHINE INVESTMENTS

Are you thinking about purchasing a new NC machine? The Tebis Simulator will help you proceed with confidence when planning your upcoming investment, assisting you to design and plan your machine tool park. Use the virtual machine models to test whether the planned NC machine can fulfill all your production requirements.

Use your typical component spectrum to test the machine's kinematics behavior and determine your future machine's actual usable workspaces. Virtually check which machine size is optimum for your manufacturing department.



Use virtual machine models to determine the workspaces for various NC machines using your own component spectrum, double-checking your high investment costs before you buy.

### More foresight, from planning to production

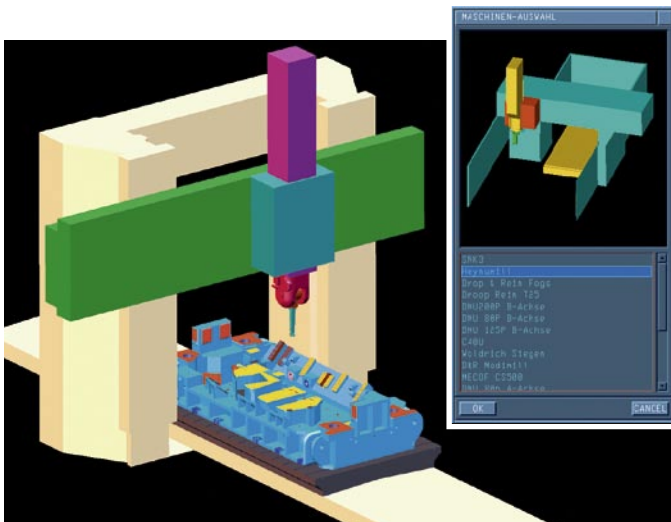
- 1 Use the analysis functions to determine component size.
- 2 Machine selection, creation and analysis of setup arrangements.
- 3 Test the setup for deep-hole drills.
- 4 Simulate an already programmed roughing process.
- 5 Simulate a contour program with automatic travel-limit switch and collision controls.
- 6 Analyze a roughing program.  
The red area of the (yellow) tool path shows collisions detected between the machine head and the table.

\* Integrated postprocessing (page 8) ensures that the processing on the machine will proceed exactly as virtually determined, tested and modified.

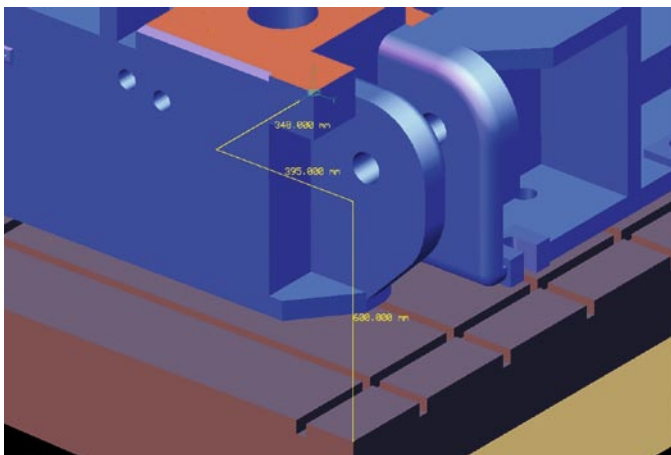
## PLAN NC PROGRAMMING

### ■ Calculate machine times

Tebis Simulator will start making your work easier as early as during the estimate phases of your jobs. By examining the setup arrangements required, you can quickly make feasibility estimates on the available machines and create a detailed cost quotation for production. Effortlessly determine what machines you can manufacture on. Calculate the number of processing steps necessary, taking into consideration the machine heads, tools and setup arrangements you will need. You will be able to evaluate critical component areas before the first NC programs have been computed. If at this point the Tebis Simulator identifies extremely time-consuming and thus high-cost production areas, you can then notify your designers early on in the process.



The system selects virtual machine models from the machine library. The virtual machines match the dimensions and kinematics of the real machines in your own workshop or in your customer's workshop.

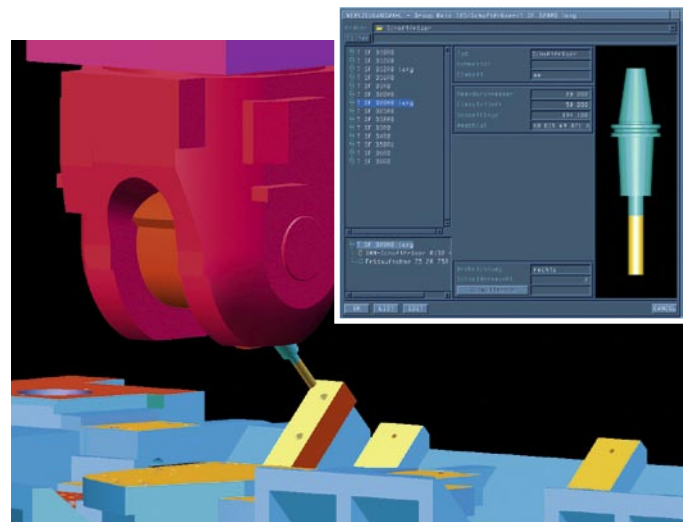


Use the analysis functions to determine distances between the component and machine components, to define the setup arrangements.

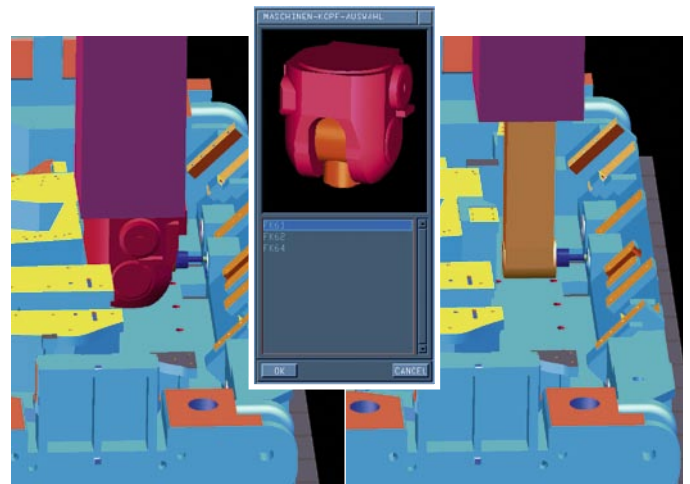
### ■ Define setup arrangements

Select a reference axis system and place the component on the worktable. Enter coordinates to move it into the correct position. Analysis functions will show you the distances and angles between the component and machine components. When you have a detailed virtual version of the machining scenario, you will find defining the correct approaches and tools is easy.

Precisely in critical component areas, such as cavities, deep drill holes and undercut areas, you must be very careful in your selection of machining tools – and for machines with multiple heads, in your selection of the proper machine head as well. Simply click on the component's geometric elements to position your machining axis systems by mouse click. You will know even before the NC programming which tools will be required and in which setup arrangements.



Planners use the tool library to ensure that suitable tools are available for critical component areas as well.



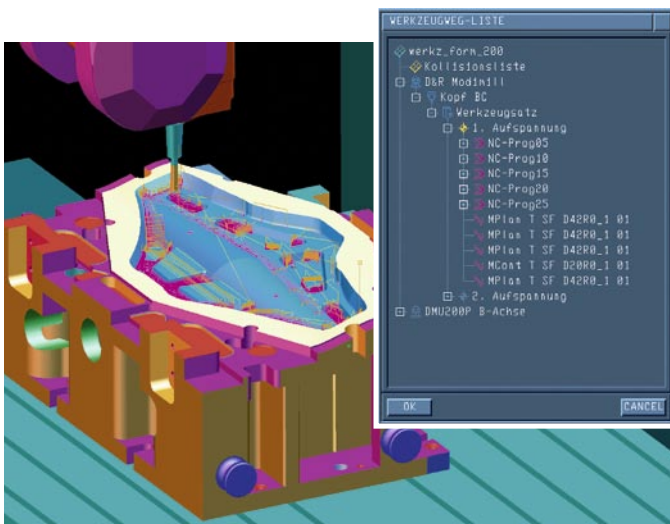
You can identify collision situations between components and machine heads early on in the process and prevent them by replacing the heads.

## MANAGE AND TEST NC PROGRAMS

The machine operator's fear that collisions will damage the components and result in expensive machine repairs is understandable. This is most frequently the reason for their overly carefully proceeding. Tebis Simulator eliminates this uncertainty because

### ■ Reduced running times thanks to NC organization across all your machines

Tebis Simulator enables users to organize the complete NC processing of the component in one multi-machine NC list. It also adds in the calculated tool paths in accordance with the production planning for each NC machine and defines the processing sequence. By cross-referencing the individual tool paths with machine and user macros, Tebis Simulator can optimize machining movements by machine and by component, thus reducing running time.



The NC list provides an overview of the machining of the component, organized by machine and setup arrangement.

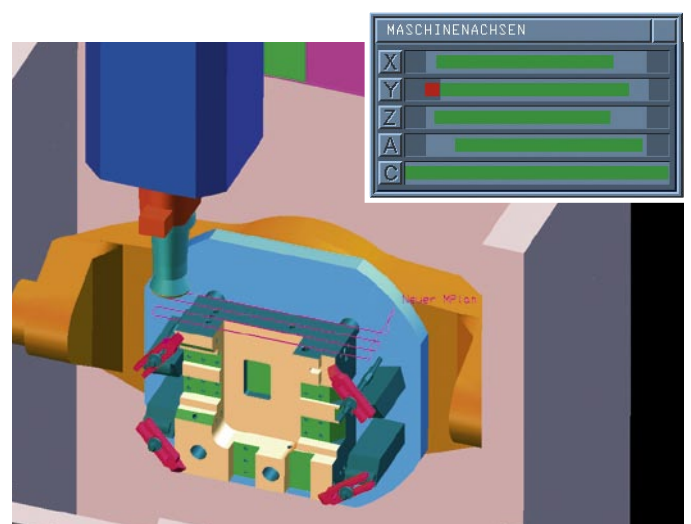
### ■ Reduced downtimes due to collision control

Collision testing of the tool paths organized in the NC list checks all machine components. You can run it as a graphic simulation or as background testing. All collisions that occur will be displayed in a table and can also be viewed graphically at the click of a button. Any collisions and travel-limit switch problems the system identifies can be easily fixed (page 6). Safely avoid collisions and thus expensive component violations and damage to your machines, and help drastically reduce downtimes.

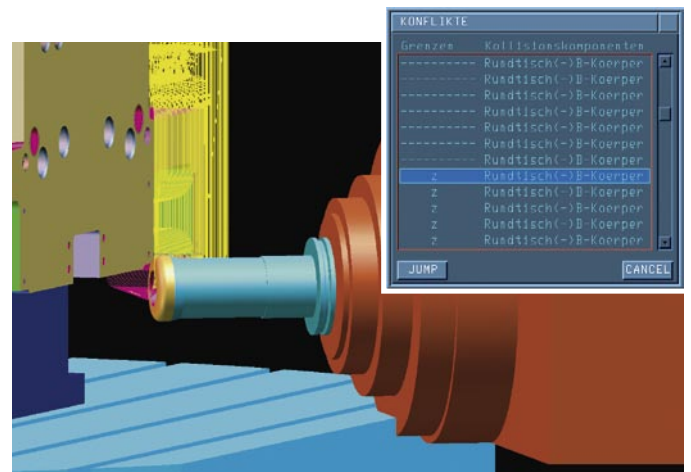
it organizes your NC manufacturing process across all your machines and displays it in detail. As a result you obtain significantly reduced machining, setup and downtime periods.

### ■ Reduce setup times by analyzing your setup options

You can simulate each tool path with reference to the component's setup arrangement and the tools used, as well as the complete machine's compliance with the rotational, tilting and travel limits (possible travel-limit switch problems). The system can check all machining movements, including the machine and user macros. On the real machines, you will be able to see the advantages: Virtually tested NC programs will run properly from the get-go and give your machine operators the security to be able to eliminate time-consuming and thus high-cost startup routines.



The system runs a travel-limit switch test to determine a component's optimum setup arrangement. The machine axes' travel areas are displayed graphically. If there are areas lying outside the machine's work envelope, they will be highlighted in red.



Any collisions found are displayed in tables and as red areas. You can jump directly to them in the simulation.

**■ Correcting detected collisions and travel-limit switch problems**

Tebis provides users with multiple options for correcting detected collision and travel-limit switch problems. Users' modifications are saved in the tool path and included in the postprocessing export.

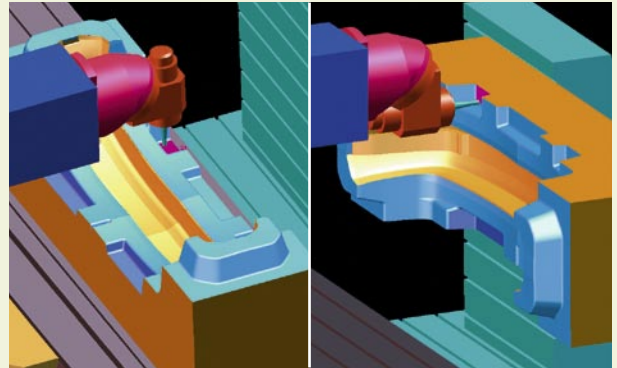
If the tool paths need to be recalculated, simply trigger an automatic recalculation by editing the concerned parameters in the job lists on appropriately equipped CAM workstations.

**Assigning a different tool to the tool path**



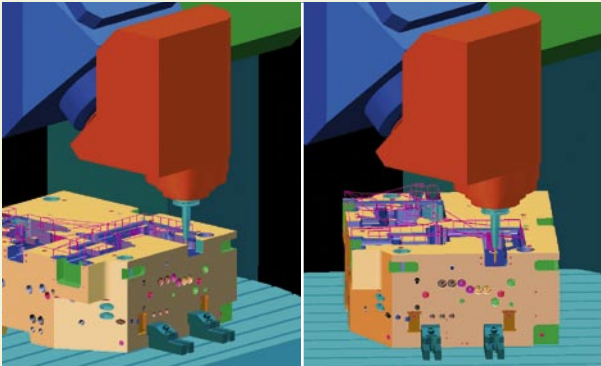
Eliminating collisions by inserting a longer tool

**Modifying the setup arrangement**



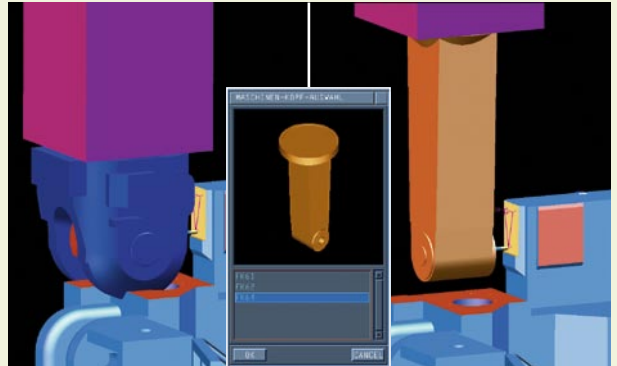
Easily modify setup arrangements to eliminate collision situations

**Modifying the behavior of freely rotatable axes**



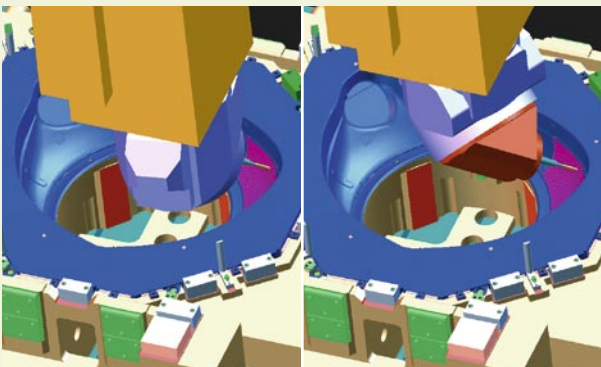
Changing freely rotatable axes for more efficient access to machining zones

**Replacing the machine head**



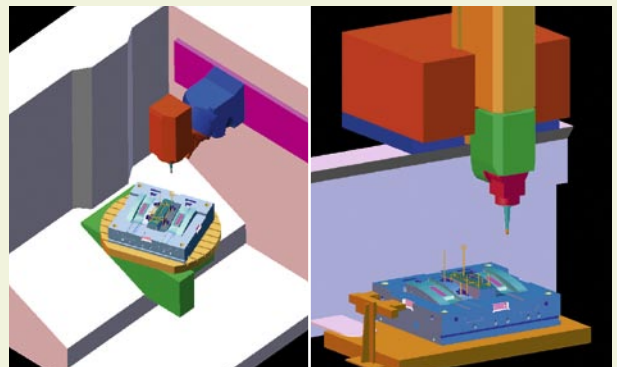
Using another machine head will frequently resolve collision situations

**Switching head orientation**



For many machines, switching the head orientation will fix problematic production situations

**Switching machines**



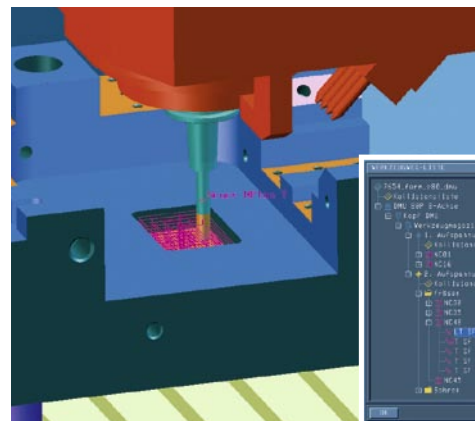
Uncomplicated machine replacement for production with more machining space or better kinematics

## WORKSHOP

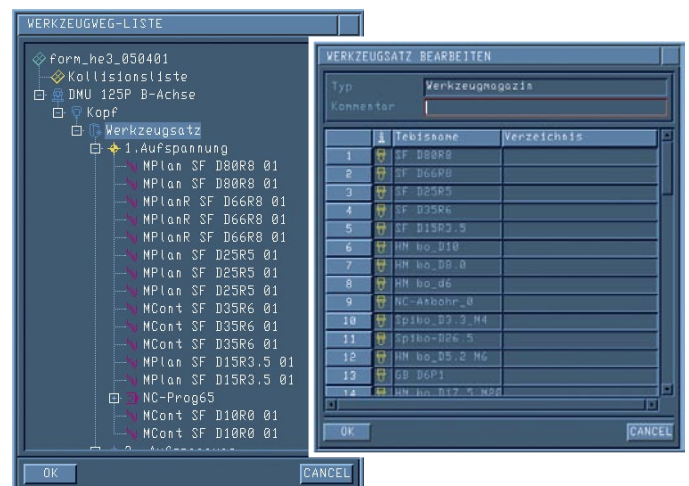
Tebis Simulator is indispensable in workshops as well. Machine operators in the mechanical production area can view and simulate the tool paths supplied by NC programming, find out about blank and component geometries, setup arrangements and the tools used during these processes. Another advantage: You can skip the NC setup documentation creation step.

### ■ Greatest flexibility in machine production

Machine operators can use Tebis Simulator not only to look up information but also to integrate their technical knowledge into the process. Whether because you need to adjust magazine assignments or technological data such as feed rates or spindle speeds, or because a setup arrangement or processing sequence has to be changed; with Tebis Simulator, you will bring the highest level of flexibility into your workshop. Especially when you are running shifts, you will generate considerable time advantages. Tebis Simulator can even help you safely manage last minute machine replacements. The system simply assigns the affected tool paths in the NC list to another machine, checks them for collisions and exports them via the integrated postprocessors.



For each tool path you can call up machining information such as travel areas, tools used and information about the NC export. You can individually adjust technological data such as feed rates and spindle speeds.



Tool path management displays the magazine assignments. You can adjust this to each machining process's requirements, as necessary.

