

Tebis simulation technologies: No compromises



CAD/CAM MES
Software & Services

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Examples from practice

Collision-free manufacturing
– The efficient approach
from Tebis
Page 3

Digital process libraries
for greater safety
Page 4

In control rather than being controlled
– The checking process
Page 5

The entire process chain
at a glance
Page 6

Summary & contact
Page 6

Safe manufacturing means collision-free manufacturing. And fast manufacturing means making optimum use of the machining area while accounting for all components with ideal travel and retract movements.

This article shows how you can unite safety and speed using Tebis simulation technologies and process libraries.

Safe manufacturing means collision-free manufacturing. And fast manufacturing means making optimum use of the machining area while accounting for all components with ideal travel and retract movements. Tebis simulation technologies and process libraries unite safety and speed.

An example from practice

While searching for a new CAD/CAM system, die manufacturer GEDIA Gebrüder Dingerkus GmbH from Attendorn, Germany, had a clear goal in mind: Unattended manufacturing over the weekend – which only works if all machines operate continuously with no interruptions. GEDIA ultimately chose Tebis. Hermann Geueke, head of machining, justifies his decision: “To reduce our collision rate to zero and to avoid time-consuming checking after postprocessing, we used a simulation of the machine model and the tools in the virtual world that had millimeter accuracy.”



Collision-free manufacturing – The efficient approach from Tebis

Most CAM systems use additional software for toolpath verification. This is inconvenient for both the CAM programmer and the machine operator and means work is repeated: The digital twins have to be managed in both systems, just as the collisions have to be corrected in both systems. Additional interface operations and coordination are also necessary. Tebis takes a different approach: The NC programs are fully collision-checked and corrected even before postprocessing. However, this is only reliable if the real manufacturing environment is completely represented in the virtual CAD/CAM world. Tebis achieves this with intelligent process libraries.

Digital process libraries for greater safety

Tebis supports all common machine types from various manufacturers on the market and their geometrical and kinematic properties – including multi-axis machines, gun drilling machines, multi-function machines such as turn-milling machines and lathes with main and sub spindles. If required, machine models can be measured and accepted on site.

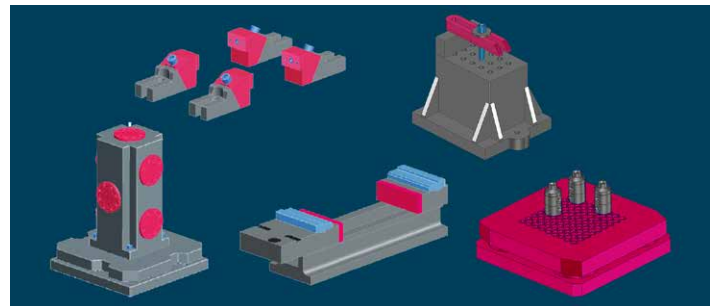
Equipment for securing workpieces can be managed and combined in clamping device groups in the Tebis clamping device library. Predefined connection points and an automated plausibility check enable the quick and convenient setup and positioning of simple vises, zero-point clamping systems and complex clamping devices with just a few clicks.

Other equipment like jaw chucks, steady rests and tips as well as machine tables, mounted parts and partitions are stored in the unit library.

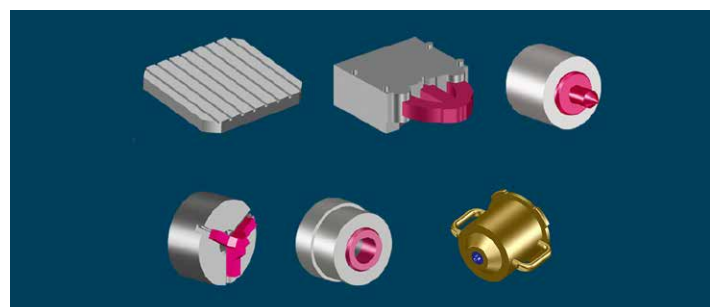
Any tool can be represented in the Tebis tool library. Precision is key: Tebis accounts for the contours of the tools with accuracy. Modern high-performance tools – like HPC cutters (high-performance cutting) for roughing, HFC cutters (high-feed cutting) for finishing and prefinishing or circle-segment cutters for finishing – can be used with perfect results. Because you can also precisely define the contact point, height and angle for circle-segment cutters, you can achieve very high surface quality with these HPC tools.



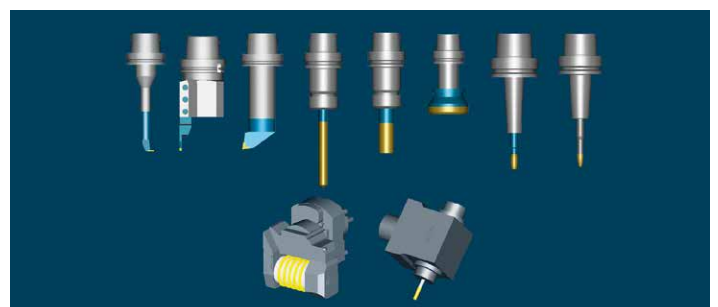
Virtual machines



Virtual clamping devices



Virtual auxiliary equipment

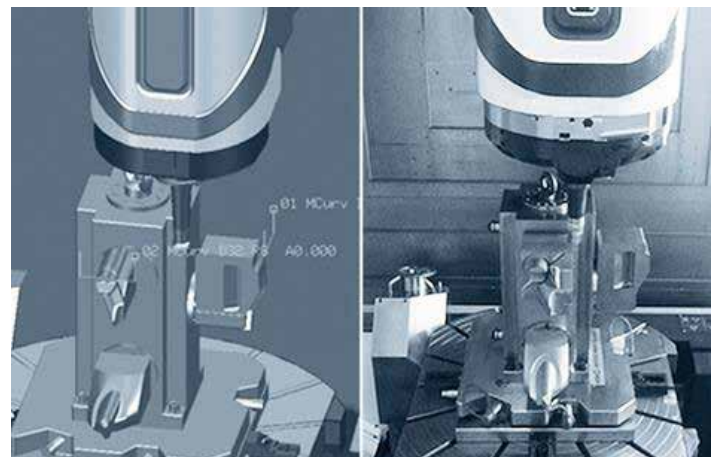
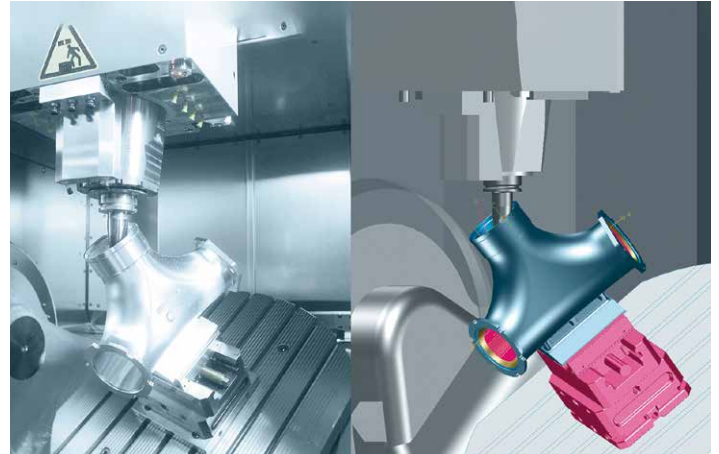


Virtual tools

In control rather than being controlled – The checking process

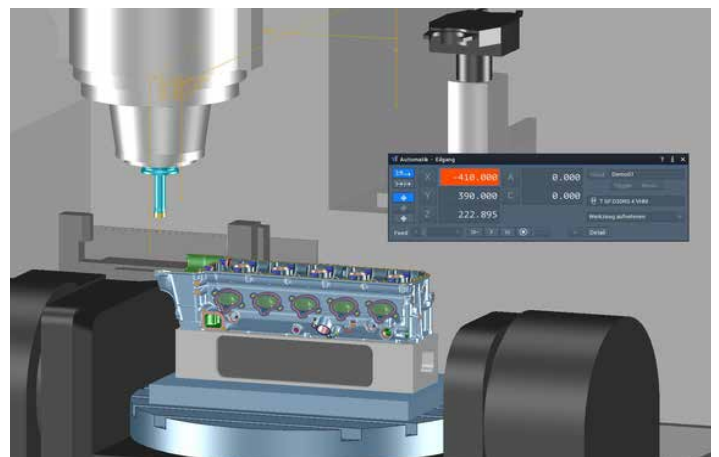
The complete machining scenario with all its dependencies, including tool and table changes, setups, starting points and connection conditions, limit switch limitations and axis or traverse movements, can only be precisely simulated using accurate process libraries.

The human operator has full control of the checking process and controls all the details of what the machine will do next. For example, retract movements must be optimally adapted to the manufacturing situation: The real machine operates in the same way as it does in the virtual world.



One scenario: Direct connection with tilted C-axis.

Carsten Wurm, head of the CAM programming team at GEDIA, has a high regard of the precise machining time calculation: "(It) ... enables us to exchange the sister tools ... completely automatically." The machine run times are determined by assessing the machine cycles and the processing speed of the control.



The entire process chain at a glance

Tebis simulation technologies can do even more: They support you in cost estimation and production planning. Defining machines, machine heads and clamping devices, selecting shuttle tables and tools, defining reference points, determining the number of machining operations, identifying and avoiding potential collisions – all this is done before the actual NC programming.

Conclusion

The Tebis approach is faster and more convenient for all participants than subsequently adjusting the NC programs in the control-specific NC format. Tebis simulation technology offers the same safety as conventional subsequent NC verification: In Tebis, you program from the beginning using digital twins that simulate all components of your real manufacturing environment in the virtual world.

This can be a relief to the NC programmer who can now focus exclusively on the core task. The programmer uses the libraries and the manufacturing knowledge stored in templates to automatically generate fully collision-checked NC programs.

Setup processes on the machinery are also simplified: Precise and detailed NC documentation is generated on NC output. The person responsible for setup can immediately see what has to be done and how the machine has to be set up. The part is brought to machine with essentially no loss of time and a collision-free program with ideal traverse movements and cutting conditions can begin immediately.