Content describes Tebis 4.0 R4
Tebis Version 4.0 Release 4

Strengths, characteristics and new features
If machines were to decide ...

... they’d choose NC programs from Tebis!
Machines love Tebis because they manufacture masterpieces in record time while avoiding collisions.

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Tebis strengths are your benefits. Efficiently and reliably manufacture high-quality parts with Tebis.

**HIGH QUALITY**

Manufacture at the highest Class A quality with Tebis. This applies not only to your CAD surfaces, but more important, to the parts you get from your machines. This is thanks to the extremely powerful Tebis surface mathematics. It enables convenient repair and optimization of free-form surfaces. Tebis also uses polynomial surfaces instead of substitute models like polyhedra in NC calculation. Tebis has a highly sensitive distribution algorithm for NC points in the NC paths and uses the exact cutter geometry when calculating NC programs for modern high-performance tools.

**EFFICIENT**

Tebis saves you time. You work more efficiently by importing the geometry via interfaces, in design, repair and preparation of the surfaces for manufacturing, in NC programming, on the machine and especially in manual reworking in tryout.

**RELIABLE**

Tebis optimally protects your personnel, machines and parts. Your shop operations are reliable because Tebis knows and always uses virtual models for your machines, tools and clamping devices. Tebis uses 5-axis avoidance and milling area reduction to prevent collisions. Tebis simulates using the exact physical properties of the machine and control. It displays detected collisions and limit switch problems in the CAM programming environment.

**TEBIS Automill®**

Tebis lets you standardize your manufacturing processes and ensures continuous high quality. Tebis process libraries allow you to save all necessary manufacturing knowledge, including machine parameters. All of your data is always up-to-date. Automill®, Tebis NC automation, is based on the process libraries, which results in tremendous time savings on NC programming for single-part manufacturing. Automill® evaluates your CAD models, accounts for your manufacturing environment and your manufacturing knowledge and automatically calculates reliable NC programs. Your Tebis process libraries are protected and can only be used by you.
Companies use Tebis Version 4.0 to organize and optimize their CAD/CAM process chains in manufacturing-intensive areas. They use Tebis systems throughout from design and engineering to equipment and part manufacturing. They benefit from the unique strengths of Tebis to deliver products at the highest quality in the shortest time, for the automotive, aerospace, machinery and equipment industries as well as appliance and medical equipment manufacturers.

Efficient and reliable manufacturing of high-quality parts

Many manufacturing methods – one software solution

You can keep all of your machinery running smoothly with software from a single source. Whether it’s 3 or 5-axis milling, drilling, turning, laser cutting, laser hardening, trimming, hammer peening or sink and wire EDM, Tebis supports the entire spectrum. This single-system strategy makes the manufacturing process more fluid, faster and more transparent.
Tebis interfaces are truly first-class. You can efficiently exchange geometries with other CAD systems like CATIA, NX or SOLIDWORKS with no loss of data. Assemblies are automatically split into individual manufacturing files upon import, with automatic optimization of surface quality. The surface quality optimized in Tebis is also retained in the target system upon export via direct interfaces.

Tebis is especially well suited for handling large or complex parts with enormous data volumes. Robust algorithms make preparation and programming a breeze, even for large parts and complex geometries. Highly complex parts are always completed on time.
NC-manufactured free-form surfaces are only as good as your CAD data. You can use the Tebis functions for designing, modeling, repairing, morphing and reverse engineering, to give your CAD models the surface quality that meets your manufacturing requirements. On exterior surfaces, Class A quality is ensured.

Active surface preparation with a tremendous impact on tryout

Specialized CAD functions for active surfaces let you design with perfectly prepared, precise surfaces on the die. You can use automatic functions to create transition-free pressure surfaces as well as radius areas adjusted for the relevant pressing conditions. This lets you manufacture your dies without NC attributes like virtual sheet thicknesses and allowances. This results in a tremendous reduction in manual tryout work after NC machining.
Specialized CAD functions enable NC programmers to conveniently prepare their manufacturing models for subsequent NC processes. This sets your course for automated NC programming and optimized surface quality.

The Tebis NC algorithms have been continuously optimized over 30 years of development and ensure time-saving and effective processing on the machines, with minimized idle travel and maximized cutting performance. This also includes demanding technical support for HFC and HPC cutters for roughing, prefinishing and finishing. You can fully exploit the potential of these tools with special contact algorithms and path layouts with full-cut avoidance.
Tebis strengths

**Virtual machine technology for maximum reliability**

Tebis process libraries reflect the actual manufacturing environment. All tools, machines and clamping devices are stored there along with their geometric and technical properties. This benefits NC programmers as they select the appropriate machine in this virtual environment, define the optimal setup and select the appropriate tools. Before processing, you can use the integrated machine simulation to check the entire operation for collisions, and limit switch violations to protect your valuable machines and parts.

Tebis detects collisions during calculation of the NC paths and automatically prevents them by reducing milling areas and with 5-axis avoidance.

**No reworking of parts with Class A manufacturing quality**

Tebis transfers the high quality of the CAD surfaces directly to the NC programs. This is because the software calculates NC paths on the mathematically precise surfaces instead of on tessellated substitute models like polyhedra. Finish quality can also be influenced by adjustable NC point distributions. This renders time-consuming manual reworking unnecessary in most cases.
Perfect for 6-axis robots as well

In addition to 3 to 5-axis machining centers, you can also use Tebis for NC programming of articulated robots with six or more axes.

Reliable planning with integrated MES solution

Proleis MES (manufacturing execution system) works hand-in-hand with Tebis and is integrated in the Tebis user interface. It lets you organize, plan and control your manufacturing projects – including machine planning, material and tool logistics. The integrated machine and operating data acquisition always keeps you supplied with up-to-date and realistic information.

Low-cost access to Tebis CAD/CAM technology

Tebis has the appropriate software package – at a variety of performance levels – for typical CAD/CAM applications. You can get started at a low cost and expand as your requirements grow.

You can individually supplement the software packages and select additional functions from the comprehensive portfolio of add-ons. Your staff can configure their Tebis workstations on-the-fly with floating licenses: if specific add-ons are used infrequently, your users can share these software components.
## Tebis 4.0 characteristics

### Better structure, more flexibility, greater convenience

<table>
<thead>
<tr>
<th>Product structure</th>
<th>The 4.0 product structure with its industry-specific application packages, performance levels and add-ons is continuously adapted to the tasks and requirements of the manufacturing industry.</th>
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</thead>
<tbody>
<tr>
<td>User interface</td>
<td>The Tebis 4.0 intuitive and ergonomic user interface is optimized for CAD/CAM workstations and is individually adaptable with 11 language versions.</td>
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<tr>
<td>Tebis Starter</td>
<td>Tebis Starter helps you easily and reliably configure and organize your Tebis workstation for your specific needs.</td>
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<tr>
<td>Interfaces</td>
<td>When the CAD model is exported, complex geometries can be automatically split into individual files for each manufactured part. The Autodesk Inventor interface is available.</td>
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<tr>
<td>Surface design with added functions</td>
<td>You can design surfaces more efficiently in Tebis by stamping structure curves, projecting any number of parallel curves on the part surface, engraving with no distortion, and creating non-overlapping shift structures at a freely definable angle – all at the click of a button.</td>
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<tr>
<td>Reverse engineering</td>
<td>Tebis 4.0 benefits you in design and engineering with new high-quality technologies, automatic functions and algorithms for reverse engineering – for low-segmentation, dense and tangential surface models.</td>
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<tr>
<td>Surface optimization with automatic mode</td>
<td>Tebis automatically detects and repairs defects in your surfaces. This lets you avoid costly problems in subsequent CAD and NC operations at the click of a button.</td>
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<td>Surface modeling with symmetry support</td>
<td>You can now model symmetrical surfaces significantly faster, because Tebis automatically models the symmetrical control points or point series.</td>
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<td>Active surface preparation with automatic mode</td>
<td>Automatic functions enable you to manufacture sheet metal draw dies with 100% designed and precise CAD geometry, including all concave and convex radii. You can freely model complex radii with large differences in radius, and offset outline surfaces by a defined angle.</td>
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<tr>
<td>Manufacturing preparation to avoid reworking</td>
<td>You can create guide and area curves oriented to characteristic lines and radius runouts, and then apply them when calculating the path layout. You can also create radii and analyze center curves to optimally prepare for subsequent steps.</td>
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<tr>
<td>NC automation, even with free-form features</td>
<td>Automated machining of prismatic geometries now also includes all freely contoured planar and pocket surfaces. Tebis automatically detects these and transfers the information to features and NCSet objects taken from the process libraries.</td>
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<tr>
<td><strong>Time savings on NC programming</strong></td>
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<td><strong>Expansion of collision avoidance</strong></td>
<td>Collisions can now also be prevented with area reduction when machining fillets (MFill) and along curves (MCurv).</td>
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<td><strong>Greater reliability</strong></td>
<td></td>
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<td><strong>Roughing with full-width avoidance</strong></td>
<td>You can avoid full cuts in roughing with high-performance HPC cutters – using either trochoidal NC paths or path layouts adapted to the geometry (adaptive roughing). This is available for 3-axis and prismatic machining.</td>
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<td><strong>Less wear, more time savings on the machine</strong></td>
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<td><strong>Finishing with constant 3D path distance</strong></td>
<td>The new &quot;Curve-synchronous&quot; and &quot;Z-variable&quot; MSurf strategies ensure better path quality and better surfaces with guide curves oriented to the part topography (characteristic lines, radius runouts).</td>
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<tr>
<td><strong>Time savings on the machine and on manual reprocessing of files</strong></td>
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<td><strong>5-axis milling expanded</strong></td>
<td>The functions for creating 5-axis NC paths have been expanded and adapted for 3-axis functions. You can also automatically smooth vectors and control tool tilting of contour cutters with barrel-shaped geometry adapted to your machining needs.</td>
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<td><strong>Greater convenience, greater functionality</strong></td>
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<td><strong>Exact determination of machining time</strong></td>
<td>Tebis now uses information from the control (for example, axis dynamics) to determine realistic machining time.</td>
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<td><strong>More realistic manufacturing planning</strong></td>
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<td><strong>Laser cutting and trimming</strong></td>
<td>The number of NC points in NC programs can be significantly reduced for optimized cycle time. The virtual machine technology for collision detection in laser toolpaths has also been included. Stanchions can be freely designed</td>
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<td><strong>Time savings on programming and machining</strong></td>
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<tr>
<td><strong>Machine collision checking</strong></td>
<td>The list of collisions with detected problem areas has been completely revised. Like the off-screen calculation of NC programs, machine collision checking can also be performed in background mode.</td>
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<td><strong>Better overview, greater reliability, time savings on programming</strong></td>
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<tr>
<td><strong>Wire EDM and turning integrated in Tebis</strong></td>
<td>Everything you need is in a single work environment: the previous versions for turning and wire EDM have been integrated into Tebis.</td>
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<tr>
<td><strong>No more special versions</strong></td>
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<tr>
<td><strong>Gun drilling</strong></td>
<td>A new tool-type and a matching machining function enhance cutting conditions and provide a high level of automation.</td>
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<tr>
<td><strong>More automation</strong></td>
<td></td>
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<tr>
<td><strong>Support for 6 axis robot kinematics</strong></td>
<td>Now you can also use Tebis for NC programming of 6-axis articulated robots. The extended virtual machine kinematics allow you to calculate collision-checked NC programs and prevent singularities.</td>
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<tr>
<td><strong>Lower investments in machine technology</strong></td>
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</table>
New features in Tebis 4.0

MILLING – PRISMATIC MACHINING

Adaptive roughing strategies available for NC2ax functions
Our proven adaptive roughing strategies have been integrated into the "NC2ax / Mill / MPlan" NC2ax functions for machining planar surfaces and into the "NC2ax / Mill / MPock" functions for machining free-form pockets. The path layout is automatically adapted to the geometry without full-cut machining. This enables highly efficient machining of parts with steep cavities. These strategies are excellent for machining with HPC cutters.

Smoothly limit path layout
New capabilities in the "NC2ax / Mill / MCont" NC2ax function for machining contours ensure a smooth path layout and improve automated NC programming by limiting the milling area (large image) without changing the path layout.

MILLING – 3-AXIS

Optimized accounting for blanks
Optimized accounting for blanks when roughing planar surfaces with the "NC3ax / Rplan" function enables you to stay flexible and also achieve an outstanding machining result for complex blank geometries. You select the directions from which to view the blank based on its geometry and required computations.

MILLING – 5-AXIS

Convenient operation
Ease-of-use has been significantly improved in 5-axis NC programming. Variables are automatically smooth, ensuring optimal tool orientation (large image). Toolpaths optimized for tilt direction can be easily created in the "NC5ax / Mcurv" function using the "Normal to component" option without manually defining vectors.

Adaptive control of tool tilt
A special highlight is our extended support for contour cutters with barrel-shaped geometry for machining standard or ruled geometries. Tool tilt can be optimally controlled using the "Increasing" and "Variable" functions as needed. This allows you to protect your tools and reduce machining times with optimal downfeed.

CAD and CAM optimally harmonized
Use the "NCPrep / MidCurve" function to quickly and easily select center curves created in NC programming as structure curves without having to design your own guide elements.
Improved cutting conditions for automated machining
A new tool type and a matching machining function enhance automation of calculation and machining. The tool type has an extended set of cutting data with specific speeds, feed rates, cooling types and depth sections. The new MDeep2 machining function provides additional parameters for defining optimal cutting conditions in all material and gap areas.

GUN DRILL MACHINING

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Easily define modified areas
After making changes to a part, area curves can be easily created and saved directly in distance analysis with the "Design / Analyze / Compare" function. All your NC programmers have to do is select the corresponding modified area.

Optimal part preparation
The "NCPrep / MidCurve" function can be used to analyze radii, automatically assign colors and create center curves. This enables you to optimally prepare subsequent steps — whether for laser hardening of radii, radius relief in active surface preparation, or creating structure curves for 5-axis NC programming.

Inventor interface
The Autodesk Inventor interface is available for the Inventor "Parts" (IPT) and "Assemblies" (IAM) file formats. As with all Tebis interfaces, structure information is imported along with the geometry.
3D DESIGN

Create complex shift surfaces without overlap
You can use the “Design / Surf / Move” function and create shift surfaces without overlaps or reworking. For example, you can trim surfaces or outlines in die manufacturing, and then freely define the desired angle.

ACTIVE SURFACE DESIGN

Relieve outline surfaces at an angle
You can benefit from the extended capabilities for designing outline surfaces and relieve these by a defined angle using the "ActSurf / Contour" function. Overlaps are automatically avoided even for very small radii and surfaces can be milled or processed by wire EDM with no reworking, whether you manufacture small or large parts.

Easily model complex radii
The "ActSurf / Reduce" function for relieving radii now allows you to easily model even complex areas with large differences in radius. This enables a constant relief in the die so you can prepare your die surfaces more quickly and achieve outstanding surface quality.

LASER CUTTING AND TRIMMING

Stanchion design completely revised
The revised stanchion design ensures a greater degree of automation and more flexibility. No limits are placed on the designer in stanchion layout: it can be freely designed, combining stanchions with different orientations in groups. The stanchions can also be automatically trimmed for weight reduction. The of automatic element selection and template management functions have also been extended.

Fast track to the machine and modifications without losing time
New shape elements such as triangles, pentagons, hexagons and key holes ensure time-optimized machining. Modifications can be quickly and conveniently incorporated.

TURNING

Greater manufacturing reliability
Tool collision checking distinguishes between the cutting and non-cutting areas of the insert, preventing cutter breakage. Only the cutting area (1) is accounted for when the blank is updated; the non-cutting area (2) is output as a collision on contact with the part.
MACHINE TECHNOLOGY

Efficient use of robots
Using part-to-tool technology (part-driven robotic machining), you can deburr parts immediately after unloading the machine without having to reclamp the part.

Flexible use of cutters
Cutter references can be automatically or manually addressed in individual toolpaths for NC output. This gives you maximum flexibility when fine-tuning in manufacturing. Specific control defaults are also supported.

Optimal use of tools
You can specify individual service life and warning times for cutters of all tool types in the library. All information on service life and warning times can be directly transferred to the Proleis MES system to ensure your tools are replaced on time. This allows you to further optimize your end-to-end manufacturing planning.

AUTOMATED NC MACHINING

Faster NC programming, greater reliability
New functions support automated NC programming – NC programs can be generated more quickly and manufacturing is more reliable. You can complete the NC calculation and collision check with the tool and machine in a single step, and assign the predecessor blank in the Job Manager across machining operations.