LASERTEC Shape
LASERTEC PrecisionTool
LASERTEC FineCutting
LASERTEC PowerDrill

Progress Through Innovation

LASERTEC Series
The next generation of 3D laser machining.

LASERTEC unlocks new economic opportunities for laser precision machining of technical surface structures, intricate cavities, fine engravings, inscriptions and holes with a wide variety of high-tech materials and diamond tools. The 5-axis laser texturing of geometrically defined surface structures in free form surfaces offers new, almost unlimited design possibilities for the production of injection molding tools for mold making.

The LASERTEC product line itself focuses on four technology areas: Shape, PrecisionTool, Fine-Cutting and PowerDrill. Depending on the application and component requirements, different laser sources are used, including YAG / fiber and picosecond lasers. User-specific software packages facilitate operation and programming for a wide range of applications.

Flexible LASERTEC technology integration in 5-axis milling machines from DMG MORI.

By using a special device, a laser scanning head can be substituted into the milling machine. It can be adapted to the milling spindle within minutes via the HSK-63 / -100 interface. This flexible LASERTEC technology integration allows 5-axis milling and laser texturing of injection molds in a single setup on one machine. As a globally unique feature, this innovation can be integrated into the DMU 65 / 125 monobLOCK® as well as the DMU 210 PORTAL machine from DMG MORI.
LASERTEC Shape
Laser structuring of geometrically defined surfaces in plastic injection tools for mold making. 3D laser ablation for filigree cavities, engravings and inscriptions.

Technology Highlights
Pages 22–29

LASERTEC PrecisionTool
Cutting edges, clearance angles and chip breakers in PCD, CVD-D precision tools. Cut out of inserts made of PCD and CBN. Carbide extrusion dies for indexable inserts as well as prototypes.

Technology Highlights
Pages 30–35

LASERTEC FineCutting
Highly dynamic 5-axis laser fine cutting of sheets, pipes and 3D parts. Production of components for the watch / medical industry and stamping part components.

Technology Highlights
Pages 36–37

LASERTEC PowerDrill
High precision 5-axis laser drilling of cooling air holes in turbine components for aircraft engines and industrial gas turbines.

Technology Highlights
Pages 38–41

LASERTEC Series
Machine Features
Pages 04–21
From filigree embossing tools for the watch industry to dashboards for cars, from small helicopter turbine blades to combustors for large industrial gas turbines – LASERTEC has the right machine platform for every application.

Depending on the integrated laser source and programming software, the basic machines are set up for the different laser technologies. For surface texturing, the laser technology of the LASERTEC 65 / 125 / 210 is integrated into the milling center via HSK interface, making complete machining (milling and laser structuring / engraving) on one machine possible.
Highest Stability / Long-term Stability

All LASERTEC Series machines are based on a highly stable cast frame construction. The combination of precision construction and a direct measuring system ensure long-term stability and accuracy.

5-axis Machine Version

All machines are available as a 5-axis version for laser machining of complex component geometries on one machine. Depending on the series, various 5-axis kinematics are employed.

Precision

Latest generation of scanners combined with tailored precision optics for highest accuracy, even for long-term operation.
Powerful Control

Uniform control philosophy with SINUMERIK 840D solutionline 3D continuous path control (STATE-OF-THE-ART).

LASERSOFT Software Packages

Application-specific software packages facilitate machine programming and operation. Customized programming systems allow easy creation of machine programs based on CAD data. Complex processes can be depicted graphically in advance using simulation tools.

Flexible Technology Integration

Integration of a laser scanning head via HSK 63/100 interface: Globally unique technology with the combination of 5-axis milling and laser texturing on one machine.
Application-specific laser sources available.

<table>
<thead>
<tr>
<th></th>
<th>Shape</th>
<th>FineCutting</th>
<th>PrecisionTool</th>
<th>PowerDrill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q-Switch / Fiber</td>
<td>CW Fiber</td>
<td>QCW Fiber</td>
<td>Fiber</td>
</tr>
<tr>
<td>LASERTEC 20</td>
<td></td>
<td>300 W.</td>
<td>1.5 – 9 kW.</td>
<td>100 W.</td>
</tr>
<tr>
<td>LASERTEC 40</td>
<td>20 W. 100 W.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LASERTEC 50</td>
<td>100 W. 25 W. 50 W.</td>
<td>300 W.</td>
<td>1.5 – 9 kW.</td>
<td></td>
</tr>
<tr>
<td>LASERTEC 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LASERTEC 130</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LASERTEC 65 / 125 / 210</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The LASERTEC 20 combines dynamic performance, precision, compactness, versatility and intelligence in one high-tech machine. Linear drives in X / Y / Z with > 2 g., a 5-axis portal design with integrated NC swivel rotary table on a 37.7 ft.² footprint, high contour accuracy and the numerous application-specific LASERSOFT software features are only the most impressive highlights of this precision machine. The universal 5-axis kinematics with integrated A- and C-axis, long-term stable monoBLOCK® design as well as excellent positioning and repeatability accuracy make the LASERTEC 20 ideal for high-tech manufacturing of precision tools and 3D fine cutting of precision parts for the watch and medical industries.
PH 10|100 Linear Magazine Automation

Highly compact handling system with application-specific expansion options.

The integrated PH 10|100 automation solution allows substitution of 42 HSK tools or several hundred cutting inserts (option: retractable drawer) into the work area from above. A workpiece change takes ≤ 30 seconds.

The compact, integrated design ensures optimal access to the work area and automation.

Highlights

+ Compact linear magazine with best accessibility and workpiece automation from above
+ Max. 42 HSK tools with up to 22.0 lbs. total weight
+ Dynamic pallet change in ≤ 30 seconds
+ Option: Interchangeable grippers on the handling arm e.g. for HSK tools, cutting inserts or shaft tools
+ Compact and integrated design with a footprint of only 64.6 ft.²
LASERTEC 20 and PH 101100 Linear Magazine

Technical data

<table>
<thead>
<tr>
<th>Available as</th>
<th>PrecisionTool / FineCutting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Area</td>
<td></td>
</tr>
<tr>
<td>X-axis</td>
<td>in. 7.9</td>
</tr>
<tr>
<td>Y-axis</td>
<td>in. 15.7</td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>in. 11.0</td>
</tr>
<tr>
<td>Table size (3 axes)</td>
<td>in. –</td>
</tr>
<tr>
<td>Max. table load (3 axes)</td>
<td>lbs. –</td>
</tr>
<tr>
<td>A-axis (swivel range)</td>
<td>Degrees –10 to +130</td>
</tr>
<tr>
<td>C-axis (turning range / speed)</td>
<td>Degrees / rpm. 360° / 150</td>
</tr>
<tr>
<td>Table size (5 axes)</td>
<td>in. ø 7.9</td>
</tr>
<tr>
<td>Max. table load (5 axes)</td>
<td>lbs. 22.0</td>
</tr>
</tbody>
</table>

| Traverse Speed |                             |
| Rapid traverse in X / Y / Z | ipm. 1,574.8 / 1,574.8 / 1,574.8 |
| Acceleration | g. > 2                       |

| Connection Load and Aggregates |                             |
| Connection power (incl. aggregates) | kVA. max. 40             |
| Operating voltage | V./Hz. 400 / 50          |
| Machine / Unit weight | lbs. 8,267.3         |
| Machine dimensions W / D / H | in. 86.6 / 79.5 / 86.6 |
| Extraction unit dimensions W / D / H | in. 13.4 / 26.0 / 55.1 |
| Footprint W / D / H | in. 101.1 / 96.9 / 93.8 |

| Control |                             |
| CNC control | Siemens 840D solutionline |

PH 10 | 100 linear magazine – Expansion options (example)

<table>
<thead>
<tr>
<th>Max. number of levels</th>
<th>6* / 4**</th>
<th>6* / 4**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of places per level</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Module dimensions (center HSK reception to center HSK reception)</td>
<td>3.7 in.</td>
<td>7.5 in.</td>
</tr>
<tr>
<td>Max. tool dimensions</td>
<td>3.3 in.</td>
<td>5.5 in.</td>
</tr>
<tr>
<td>Max. tool length (from the HSK flange contact)</td>
<td>9.4 in.</td>
<td>9.4 in.</td>
</tr>
</tbody>
</table>

* Tool length is max. 5.3 in., ** Tool length is max. 9.4 in.
5-axis version with integrated A- / C-axis.

Work area with an integrated NC swivel rotary table (4th / 5th axis), laser source: 100 W. fiber laser, laser head with a new precision scanner and integrated, infrared measuring probe, HSK-63 interface integrated in the machine table (option).

**Long-term Stability**
Stable, vibration-dampening cast mineral stand (approx. 3.3 t.) in the monoBLOCK® design with a compact 37.7 ft.² footprint.

**Linear Technology**
Linear drives with > 2 g. max. acceleration as well as precision cooling in X / Y / Z (standard) / 6-month warranty.

**3D Workpiece Measuring**
High-precision workpiece measuring and workpiece positioning in the work area.

**Zero Point Clamping System**
Consistently precise workpiece handling e.g. via HSK interface.
Production of 2D and 3D engravings with 6-axis technology.

With the LASERTEC 40 Series, finest contours, cavities, 3-dimensional laser engravings as well as components with steep walls can be produced quickly, safely and consistently while retaining exceptional quality (laser focus diameter of 0.002 in.). 6-axis technology (3 optical and 3 mechanical axes) and new, powerful software options open many additional application possibilities and target industries. These range from engravings to the production of filigree, technical components for tool and mold making. Machining is based on 3D data, without tool costs and electrode production or tool wear.

**Highlights**

+ The right laser source for every application (fiber laser with 20 / 100 Watts, picosecond laser with 25 / 50 Watts)
+ Scan field: 2.4 x 2.4 in., 0.001 in. laser spot
+ High-resolution camera system for automatic fine alignment of components
+ Contour-parallel lasering through 6-axis technology
+ LASERSOFT 3D with DMG ERGOline® control panel featuring special software functions (e.g. software options: engraving, contour lasering, greyscale bitmaps, cylinder machining)
1: X- / Y-cross table with 11.8 × 15.7 in.  2: Optional rotary axis for cylindrical parts  3: Multiple workpiece holder for serial production  4: Measuring probe for depth control  5: Precision optical scanner  6: Basic machine structure without housing

<table>
<thead>
<tr>
<th>Available as</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Work Area</strong></td>
<td></td>
</tr>
<tr>
<td>X-axis</td>
<td>in.</td>
</tr>
<tr>
<td>Y-axis</td>
<td>in.</td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>in.</td>
</tr>
<tr>
<td>Table size (3 axes)</td>
<td>in.</td>
</tr>
<tr>
<td>Max. table load (3 axes)</td>
<td>lbs.</td>
</tr>
<tr>
<td><strong>Connection Load and Aggregates</strong></td>
<td></td>
</tr>
<tr>
<td>Connection power (incl. aggregates)</td>
<td>kVA.</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>V./Hz.</td>
</tr>
<tr>
<td>Machine / Unit weight</td>
<td>lbs.</td>
</tr>
<tr>
<td>Machine dimensions W / D / H</td>
<td>in.</td>
</tr>
<tr>
<td>Extraction unit dimensions W / D / H</td>
<td>in.</td>
</tr>
<tr>
<td>Footprint W / D / H</td>
<td>in.</td>
</tr>
</tbody>
</table>
The LASERTEC 50 is a highly dynamic laser precision machine capable of handling challenging 5-axis operations with its built-in X- and Y-axis linear drives, featuring > 1g. acceleration as well as water-cooled torque drives in the 4th and 5th axis. This flexibility, along with numerous application-specific machine options and laser sources, make this machine universally suited for almost all LASERTEC technology sectors.

With a footprint of only 43.1 ft.² and a large work area featuring travels of 19.7 in. × 19.7 in. × 27.6 in. in X / Y / Z, this machine not only stands out with its high dynamics, precision, flexibility and long-term stability, but also with optimal accessibility and compactness.

LASERTEC 50

Highly dynamic 5-axis laser precision machine with linear drives.
1: Large work area with optimal workpiece accessibility  
2: Massive, long-term stable cast mineral stand  
3: Precision scanner, CCD camera and measuring probe  
4: Laser precision machining with up to 5 axes and Siemens 840D Solutionline  
5: Linear drives and laser are located outside of the work area

### Available as

<table>
<thead>
<tr>
<th>Work Area</th>
<th>X-axis</th>
<th>Y-axis</th>
<th>Z-axis (focusing axis)</th>
<th>Table size (3 axes)</th>
<th>Max. table load (3 axes)</th>
<th>A-/ B-axis (swivel range)</th>
<th>C-axis (speed)</th>
<th>Table size (5 axes)</th>
<th>Max. table load (5 axes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>in.</td>
<td>in.</td>
<td>in.</td>
<td>lbs.</td>
<td>degrees</td>
<td>degrees</td>
<td>in.</td>
<td>lbs.</td>
</tr>
<tr>
<td>19.7</td>
<td>19.7</td>
<td>27.6</td>
<td></td>
<td>15.7 x 19.7 (work surface)</td>
<td>330.7</td>
<td>–100 to +160</td>
<td>360° continuous</td>
<td>a 7.9</td>
<td>30.9</td>
</tr>
</tbody>
</table>

### Traverse Speed

<table>
<thead>
<tr>
<th>Rapid traverse in X / Y / Z</th>
<th>ipm.</th>
<th>2,362.2 / 2,362.2 / 1,181.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceleration</td>
<td>g.</td>
<td>1</td>
</tr>
<tr>
<td>Machine / Unit weight</td>
<td>lbs.</td>
<td>11,023.1</td>
</tr>
<tr>
<td>Footprint W / D / H</td>
<td>in.</td>
<td>145.7 / 167.3 / 94.5</td>
</tr>
</tbody>
</table>

### Control

| CNC control | Siemens 840D solutionline |
The highly dynamic LASERTEC 65 combines, for the first time, all the stability advantages of the monoBLOCK® design with the benefits of a quick swivel rotary table and is the most compact machine in its class, with an 80.7 ft.² footprint. Equipped with an optimally accessible, large work area and travels of 25.6 x 25.6 x 22.0 in. (X / Y / Z), it dominates as a highly flexible 5-axis machine for all laser and milling applications with an uncompromisingly high level of quality. For the first time, the LASERTEC 65 Shape offers 5-axis milling and laser structuring of 3D plastic injection mold tools on one machine in a single setup. After the milling of the mold, a geometrically defined surface structure is applied via fiber lasering. Final erosion or etching is not necessary.
1: Large work area with perfect accessibility, crane loading from above is possible.  
2: Highly stable, compact monoBLOCK® design.  
3: Flexible integration of a laser scanning head via an HSK interface on the spindle.  
4: 5-axis laser texturing of a steering wheel injection mold.

<table>
<thead>
<tr>
<th>LASERTEC 65 Shape (monoBLOCK®)</th>
<th>LASERTEC 125 Shape (monoBLOCK®)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travel (X / Y / Z)</strong></td>
<td>25.6 / 25.6 / 22.0</td>
</tr>
<tr>
<td></td>
<td>ø 33.1 × 19.7</td>
</tr>
<tr>
<td><strong>Max. workpiece dimensions (5-axis)</strong></td>
<td>ø 56.7 × 31.1</td>
</tr>
<tr>
<td><strong>Max. load weight (5-axis)</strong></td>
<td>1,322.8 (2,204.6*)</td>
</tr>
<tr>
<td></td>
<td>approx. 85.0</td>
</tr>
<tr>
<td><strong>Min. footprint (only machine)</strong></td>
<td>approx. 215.3</td>
</tr>
<tr>
<td><strong>Control type</strong></td>
<td>SIEMENS 840D solutionline with DMG ERGOline® control</td>
</tr>
<tr>
<td></td>
<td>SIEMENS 840D solutionline with DMG ERGOline® control</td>
</tr>
</tbody>
</table>

* Pure laser processing machine

Laser power: Fiber laser with max. 200 Watt output with various focal lengths.
LASERTEC 80 / LASERTEC 130

Strong performance in laser machining of turbine components up to XXL.

High positioning accuracy and dynamics of the X- / Y-axis, the Z-axis as a ball screw drive and rotary axes with torque technology are just some of the LASERTEC 80 highlights. The X- / Y-cross table with Direct Drives and a massive machine bed with 3-point support allow high-precision 5-axis laser machining. Integration of varying laser resonators and easy maintenance with optimal accessibility to the laser via a walk-in stand further enhance this offering.

The LASERTEC 130 sets the standard for drilling large turbine components. Two highly dynamic torque motors in the component rotary axis and the laser head ensure highest precision and fastest machining. With the integrated focusing head changer, the LASERTEC 130 has a wide range of applications, including aerospace / power generation as well as 5-axis laser drilling for sizes up to 51.2 in.

LASERTEC 80

**Highlights**

+ 5-axis laser precision drilling of cooling air holes in turbine components
+ Linear drives in X / Y with 1.2 g.
+ 4th / 5th axis with torque technology
+ Automatic breakthrough detection guarantees faster machining
+ Highly precise Nd: YAG laser with 300W. / 500W.
+ CCD camera and 3D measuring probe for fast setup
+ Siemens 840D solutionline with special LASERSOFT PowerDrill software features
+ Also available as a PowerShape machine version for producing shaped hole geometries
LASERTEC 130
1: 5-axis laser drilling with swiveling laser head and integrated NC rotary table
2: Automatic focusing head changer
3: Double collision protection in the laser head and laser nozzle

<table>
<thead>
<tr>
<th>Available as</th>
<th>LASERTEC 80</th>
<th>LASERTEC 130</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Area</td>
<td>PowerDrill</td>
<td>PowerDrill</td>
</tr>
<tr>
<td>X-axis</td>
<td>in.</td>
<td>31.5</td>
</tr>
<tr>
<td>Y-axis</td>
<td>in.</td>
<td>19.7</td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>in.</td>
<td>27.6</td>
</tr>
<tr>
<td>Table size (3 axes)</td>
<td>in.</td>
<td>35.4 x 23.6</td>
</tr>
<tr>
<td>Max. table load (3 axes)</td>
<td>lbs.</td>
<td>440.9</td>
</tr>
<tr>
<td>B-axis (swivel range)</td>
<td>degrees</td>
<td>–100 to +150</td>
</tr>
<tr>
<td>C-axis (speed)</td>
<td>degrees</td>
<td>360° continuous</td>
</tr>
<tr>
<td>Table size (5 axes)</td>
<td>in.</td>
<td>ø 7.9 / 15.7</td>
</tr>
<tr>
<td>Max. table load (5 axes)</td>
<td>lbs.</td>
<td>30.9 / 88.2</td>
</tr>
<tr>
<td>Traverse Speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid traverse in X / Y / Z</td>
<td>ipm.</td>
<td>4,724.4 / 4,724.4 / 1,181.1</td>
</tr>
<tr>
<td>Acceleration</td>
<td>g.</td>
<td>1.2 (X / Y)</td>
</tr>
<tr>
<td>Connection Load and Aggregates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection power (incl. aggregates)</td>
<td>kVA.</td>
<td>max. 72</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>V./Hz.</td>
<td>400 / 50</td>
</tr>
<tr>
<td>Machine / Unit weight</td>
<td>lbs.</td>
<td>15,432.4</td>
</tr>
<tr>
<td>Footprint W / D / H</td>
<td>in.</td>
<td>177.2 / 236.2 / 90.6</td>
</tr>
<tr>
<td>Control</td>
<td>Siemens 840D solutionline</td>
<td>Siemens 840D powerline</td>
</tr>
</tbody>
</table>

**Highlights**

- Highly dynamic 5-axis laser drilling of cooling air holes in combustors, vanes and blades (up to max. 51.2 in.)
- Automatic focusing head changer
- Swivel head (B-axis: ± 150°) and rotary table (360°, continuous) with torque motors
- Double collision protection in the laser head and laser nozzle
- Constant optical path for consistent drilling quality
- High-speed shutter enables SynchroDrill (synchronized laser drilling with a rotating component)
- Siemens 840D powerline with special LASERSOFT combustor software features
LASERTEC 210

Unique technology combination: 5-axis milling and laser structuring in XXL.

The LASERTEC 210 Shape provides a universal solution for 5-axis milling / laser complete machining of injection molds up to 6.9 ft. The laser head can be flexibly integrated into the milling spindle via HSK-A63 or HSK-A100 interface within 10 minutes. During the actual milling operation, all optical components of the laser are located outside the work area.

The portal series is successful and proven with more than 900 machines installed worldwide. It is based on a FEM-optimized machine concept with a portal design. The thermo-symmetrical structure, with liquid-cooled ball screws and cooled feed motors on all axes, provides the highest level of dynamics and long-term precision. The portal design of the LASERTEC 210 enables simple and effective machining of workpieces up to 11.0 t.

Highlights

+ Thermo-symmetrical structure and 3-point support for quick setup
+ Short and constant projection of the milling head (no ram design)
+ Portal design with vertically traversable crossbeams featuring hydraulic weight compensation for highest precision and dynamics
+ Feed and rapid traverse up to 2,362.2 ipm.
+ Machining of workpieces up to 8.8 t. (optional: 11.0 t.)
1 – 3: Placing of the laser scanning head via a special changing device within 10 minutes; interface is the HSK 63/100 reception of the spindle.  

4: B-axis swivel head with a large swivel range: –30° / +180°

<table>
<thead>
<tr>
<th>LASERTEC 210 Shape (Portal)</th>
<th>70.9 / 82.7 / 49.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. workpiece dimensions (5-axis) in.</td>
<td>Ø 2,78.7</td>
</tr>
<tr>
<td>Max. load weight (5-axis) lbs.</td>
<td>17,637.0 (Option: 22,046.2)</td>
</tr>
<tr>
<td>Min. footprint (machine only) ft.²</td>
<td>approx. 473.6</td>
</tr>
<tr>
<td>Control type</td>
<td>SIEMENS 840D solutionline with DMG ERGOLine® control</td>
</tr>
<tr>
<td>Rapid traverse in X / Y / Z ipm.</td>
<td>2,362.2 / 1,574.8 / 1,574.8</td>
</tr>
</tbody>
</table>

**Connection Load and Aggregates**

| Connection power (incl. aggregates) kVA. | max. 103 |
| Operating voltage V./Hz. | 400 / 50 |
| Machine / Unit weight lbs. | 92,594.2 |
| Machine dimensions W / D / H in. | 241.9 / 287.7 / 210.4 |
| Extraction unit dimensions W / D / H in. | 55.1 × 55.1 × 78.7 |
| Cooling unit dimensions W / D / H in. | 43.7 / 31.5 / 57.1 |
| Footprint W / D / H in. | 393.7 / 472.4 / 210.4 |

**Control**

| CNC control | Siemens 840D solutionline |
3D laser ablation

1: Fine contours and filigree cavities

5-axis laser texturing

2: Design advantage for injection mold making
LASERTEC Shape

LASERTEC Shape: Filigree surface texturing, 3D ablation, laser engraving.

With the LASERTEC Shape Series, fine contours and filigree cavities for injection molds, extrusion dies, inscriptions and other engravings can be consistently and reliably produced with the highest quality and minimal tool wear. Depending on the application, three laser sources featuring different ablation characteristics are available: diode, fiber, and picosecond lasers. Depending on the material and laser source, walls up to max. 0.08 in. deep or surface qualities of Ra = 0.00001 in. are possible.

The machine program itself can be generated automatically from the 3D CAD data of the actual workpiece. The optionally available LASERSOFT software packages simplify, for example, contour generation, lettering, logos and surface structuring in 3D surfaces, cylinders or free-form surfaces.

LASERTEC Shape Operating Principle

1: Manufacture of technical mold components made of carbide
2: Engravings in coins and medals
3: Engravings / Inscriptions
4: Steering wheel cap with a honeycomb structure
5: Mobile phone case with surface structures

Laser ablation in horizontal layers (layer thickness dependent on laser and material: 0.00001 – 0.0004 in.)
Laser ablation with contour parallel finishing (S-option)
Machining with a tilted laser beam for steep walls
3D Laser Ablation

3D laser ablation for the production of miniature molds, extrusion dies, inscriptions and engravings.

Highlights / 3D Laser Ablation

+ **Flexible for many applications**: Engravings and inscriptions, coins and medals, extrusion dies, technical miniature molds, injection molds for the toy industry

+ **Laser machining of standard materials** as well as advanced materials, including glass, ceramics and carbide

+ **Feasibility of steep walls** of the highest quality, with highest process reliability (depending on the material)

+ **Easy and fast importing of CAD data**

LASERSOFT 3D software features:

**3D Draft Angle with Defined Wall Angles**

Starting with 2D CAD data in DXF format, the program takes into account the desired depth and draft angle to automatically generate the program for the laser machine. This means easy creation of engravings, logos, symbols, simple tools, etc.

**3D Bitmap Generator**

Based on greyscale images in bitmap format, different grey levels can be assigned to different depths. This allows 3D reliefs, surface structures, logos, etc. to be produced, even when using scanned documents. It is also possible to reduce data volume by converting STL data into bitmap data.
3D Cylinder Machining

This feature allows you to edit cylinder and cone geometries, which can be combined as required with a rotary axis.

3D Free Surface Projection

Vertical projection of the geometry to be machined on slightly inclined free-form surfaces. The machining geometry is extended depending on the angle of inclination of the projection surface.

Laser Marking

Inscriptions directly from the LASERSOFT 3D control software. You can select the text, font, gradient and other text attributes.

Job Creator

This software feature allows the placement of several different workpieces on the machine table (using the carrier system / pallet) as well as manual setup of the workpieces with the aid of a camera.

Auto Video Setup

Automatic calibration of clamped components incl. calculated correction (displacement or rotation) of the corresponding component programs. The built-in CCD camera finds predefined measurement points to make automatic position corrections.
Laser Texturing

Design advantage for injection mold making. The most important target markets.

The time of simple leather structure interiors for cars is as outdated as the mass-produced uniform textures of many consumer goods. Innovative 5-axis laser texturing makes it possible to quickly produce individual surface textures in plastic injection molds. This means that the design possibilities for challenging visual surfaces are now limitless.

Highlights

+ Feasibility of individual, challenging 3D textures in free-form surfaces made from injection molds
+ The high machine accuracy makes excellent contour sharpness and reproducibility possible
+ Laser lacquer removal with a track width up to 0.002 in. possible
+ Highly dynamic, temperature monitored precision scanner
+ Fiber laser with up to 200 Watts; Additional options: various focal lengths
+ Contour parallel laser shaping: Laser focus follows the 3D contour of the workpiece

Automotive

(1) Steering Wheel Cap: Honeycomb structure
(2) Motor Cover: Pyramid structure
(3) Tire Side Wall: Carbon fiber structure
(4) Glove Compartment Door: Combination of honeycomb / leather structure
(5) Connecting Rod: Cell structure
Additional Mold Making
(1) Blow Molds, PET Bottles: Nub structure
(2) Shoe Sole: Scale structure
(3) Wellness and Cosmetics, Tooth Brushes: Nub structure
(4) Food Industry: 3D engravings
(5) Plastic Chair: Wood grain

Consumer Electronics
(1) Mobile Phone Case: Leather structure
(2) Back Cover for Tablet PC: Honeycomb structure
(3) PC Mouse: Pelt structure
(4) Camera Housing: Ribbing
(5) Electric Drill Housing: Triangle / star structure
The all-encompassing LASERSOFT 3D-TEXTURE guides the user from the setup of the greyscale bitmap through to the finished, textured component. The projection of the texture on free-form surfaces is implemented via standardized software tools. The 5-axis laser machining program is generated completely automatically. Transitionless “patching” of even large surfaces and contour-parallel lasering of complex 3D free-form surfaces opens unlimited possibilities for the design and implementation of individual repeatable surface structures.
Contour-parallel Laser Shaping

Depending on the 3D contour of the workpiece, the laser focus can be dynamically shifted on the Z-axis via a Z-shift. You no longer have to reposition the laser head or the workpiece on the Z-axis for every new lasering trace, saving you significant time.

Central Supply with Texturing Data

The comprehensive, digital process chain makes it possible to generate centrally unified texturing data, which in turn can be distributed to subsidiaries, licensees and partners worldwide. This allows the same component to be manufactured with the same texture worldwide.

3 Simple Steps to Individual Textures

1. Create the texture with a CAD program
2. Create the texture with a graphics program e.g. Photoshop, Gimp etc.
3. Scan a real 3D object e.g. via GOM 3D scanner

Variable Path Field Sizes

Crucial for the quality of the mapped surface structure is the lowest possible distortion of the image on the three-dimensional contour. The individual tiles (structure fields) must be placed together so that no dividing lines and impacts are visible. The intelligent “Variable Path Field Sizes” software aids this process.
Perfect cutting edges, clearance angles and chip breakers in precision tools.
Lasering opens up a new dimension of PCD / CVD-D cutting edge machining.

Where conventional machining processes, such as grinding and eroding with high process forces as well as negative thermal reactions in diamond cutting materials, have already been pushed to their limits – innovative laser technology can unlock new machining possibilities. As a pioneer in this field, SAUER has many years of experience in laser machining of PCD, CVD-D, CBN and carbide.

The LASERTEC PrecisionTool Series covers the splitting of PCD blanks, introduction of chip breakers and finishing of cutting edges and clearance angles. As a new laser source with high energy efficiency that uses no consumable materials, the manufacturing of these diamond tools is truly a "Green Technology". 

1. **Laser Produces “Super Sharp”**
Cutting without chipping

2. **ALL-IN-1:**
Create cutting edges, clearance angles and chip breakers in PCD / CVD-D in a single setup on one machine

3. **Best Cutting Edge Quality**
without chipping. Clearance angle selection from 0° to 35°

4. **Introduction of Chip Breakers**
also in CVD-D and CBN for controlled chip breakage and longer tool life

5. **Separation and Cutting:**
Of PCD / CBN blanks 10 × faster than wire cutting

6. **Prototype Manufacturing**
of carbide indexable cutting inserts and 5-axis laser machining of carbide extrusion dies with Ra = 0.00001 in. using a picosecond laser
LASERTEC PrecisionTool

Break-out-free cutting edges, clearance angles and chip breakers in PCD / CVD-D, CBN.

**Laser Machining of PCD / CVD-D, CBN Highlights**

+ Break-out-free cutting edges due to the laser separating the diamond and binding material
+ Coarse-grained PCD grades can be processed without loss of quality
+ Chip breaker grooves can be incorporated in one setup with the cutting edge machining
+ Through the fine laser focus, inner radii of min 0.0006 in. can be created
+ Lower operating costs by eliminating the need for wire or grinding wheels
+ Contact-free precision machining without tool wear
+ Highly compact automation solutions for the handling of cutting inserts, end mills, tools with HSK reception (combination of different types of tools in one automation is possible)

**Lasering vs. Grinding and Eroding.**

<table>
<thead>
<tr>
<th>Grinding</th>
<th>Eroding</th>
<th>Lasering</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Break-out of the diamond grains</td>
<td>+ Diamond cannot be eroded, only binding material</td>
<td>+ Laser works through diamond and binding material</td>
</tr>
<tr>
<td>+ Coarse-grained PCD grades not grindable</td>
<td>+ Coarse-grained PCD grades are not erodible</td>
<td>+ Coarse-grained PCD grades can be processed without complication</td>
</tr>
<tr>
<td>+ Chip breakers not possible</td>
<td>+ Chip breakers not possible</td>
<td>+ Chip breakers are possible</td>
</tr>
<tr>
<td>+ Grinding disc wear limits edge radius</td>
<td>+ Wire diameter limits edge radius</td>
<td>+ Minimal edge radius (0.0006 in.)</td>
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<tr>
<td></td>
<td>+ Must be cut 2 – 3 times for good quality</td>
<td>+ Perfect cutting edges without break-outs</td>
</tr>
</tbody>
</table>
Prototype manufacturing of carbide indexable cutting inserts and laser machining of carbide pressing tools.

Carbide Machining Highlights

+ Simple and affordable solution for producing complete chip breaker geometries for prototypes
+ NEW picosecond laser: high-end solution for finishing of carbide extrusion dies with surface quality up to Ra 0.00001 in.
+ LASERTEC 50 with picosecond laser: 5-axis solution for complex prototypes and special machining with carbide
LASERTEC PrecisionTool Software Package

User-friendly software features for the manufacturing of all PCD tools.

**LASERSOFT insert**
+ Easy programming of standard cutting inserts by entering ISO codes or alternatively: menu-guided programming
+ Definition of measuring points for the automatic measurement of the inner circle and the position of the PCD insert

**LASERSOFT endmill**
+ Programming of simple end mills to complex progressive dies
+ DXF interface for the input of the outer contour
+ Free definition of shape and size of the clearance angle for each contour element
+ Automatic measurement of the axial and radial position of the cutting inserts with automatic program adjustment
The LASERSOFT 3D programming system, along with the powerful Siemens 840D contour control, makes CNC programming directly from 3D CAD data possible. The special software interface allows parameterized input of standard inserts for highly efficient and productive laser machining.

**LASERSOFT turning**

- For die plates with almost any contours
- Programming of fixed mold tools via the DXF interface

**LASERSOFT chipbreaker**

- Automatic programming of chip breakers, based on 3D models
- Automatic precision positioning with the Auto Video Setup image editing module
Highly dynamic 5-axis laser fine cutting

Production of challenging 2D / 3D precision cutting parts for the watch, stamping and medical industries.
LASERTEC FineCutting

Precision laser cutting of sheets, pipes and 3D parts with up to 0.0008 in. cutting gap.

The modular machine design with three to five CNC controlled axes allows the most flexible use of the LASERTEC FineCutting Series for highly dynamic precision cutting of fine stamp parts in 2D and 3D. The laser type and performance can always be adjusted to the relevant component for quality, speed, and specific material. You can choose between fiber and Nd:YAG laser sources with different laser performance.

Application examples for precision cut parts can be found in the watch / stamping / electronics and medical industry for production values with max. 0.2 in. thickness and a min. laser cutting gap of 0.0008 in. Already today, stencils, apparatus parts, watch components, medical implants, arthroscopic instruments and spinnerets for textile fibers are made on LASERTEC FineCutting machines in both prototype and serial production.

Highlights

+ Application-specific integration of different laser sources (fiber laser, QCW fiber laser, Nd:YAG)
+ Laser machining of watch / stencil / medical / fine stamp parts with a fiber laser
+ Up to 0.0001 in. component precision (3-axis)
+ Min. laser cutting gap of 0.0008 in.
+ Automation via robot loading possible
STATE-OF-THE-ART

Technology leader in 5-axis precision drilling of cooling air channels for aerospace and IGT.
LASERTEC PowerDrill / PowerShape

Cooling air holes in turbine components for aerospace and PowerGeneration.

The PowerDrill Series is specifically designed for 5-axis laser precision drilling of turbine blades and components for the aerospace industry and stationary gas turbines. Precision cooling air holes with partially conical and cylindrical shape are laser drilled in turbine vanes / blades, burners and combustion chambers as well as other components for high-pressure gas turbines using percussion drilling, trepanning or 5-axis simultaneous machining.

The automatic measuring probe and CCD camera position the component exactly in the right position, eliminating the need for complex clamping devices. After creating the cylindrical cooling air holes, they can be expanded on the LASERTEC 50 / 80 via laser ablation by a conical outlet funnel. The PowerDrill software tools enable comfortable programming and machining of complex components.

<table>
<thead>
<tr>
<th>Application Areas</th>
<th>LASERTEC 50 PowerDrill</th>
<th>LASERTEC 50 PowerShape</th>
<th>LASERTEC 80 PowerDrill</th>
<th>LASERTEC 80 PowerShape</th>
<th>LASERTEC 130 PowerDrill</th>
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<td><strong>Turbine Vanes</strong></td>
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<td>Aircraft engines</td>
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<td>Industrial gas turbines</td>
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<td><strong>Cover Sheets, Heat Shields</strong></td>
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</table>

* Up to ø 17.7 in., ** Up to ø 51.1 in.
PowerDrill Machine Options / Software Features

Technology-specific machine features and optimal performance with LASERSOFT PowerDrill.

The powerful and user-friendly Siemens 840D CNC control provides maximum operator comfort and process reliability for the laser drilling of turbine components. All available LASERSOFT PowerDrill packages combine high-tech performance with customer value, delivering easy application-oriented programming and operation.

Machine Options

**Integrated Measuring Probe**

Integrated 3D measuring probe for automatic detection of the workpiece position in the work area as well as the application of a “best fit” – algorithm, which automatically arranges the incoming cooling air holes in relation to the CAD model.

+ Customized number of measuring points possible
+ Descriptive, graphical illustration
+ Allows the use of simple workpiece holders
+ Consistently precise laser machining of high-quality components

**Break-through detection**

Fully integrated optical sensor for automatic break-through-detection during laser drilling of turbine components.

+ In-process regulation
+ Significantly reduced "back wall damage” and faster drilling
+ 20% faster machining through optimal number of impulses
+ Selectable number of cleaning impulses depending on material and application
Software Features

**LASERSOFT PowerDrill**
+ 3D laser drilling programming system and special “repair & redrilling” software
+ Automatic probing and positioning of the workpiece
+ Cycles for percussioning and trepanning
+ 5-axis simultaneous machining of shaped drillings

**LASERSOFT Simulation**
+ Graphical 3D simulation incl. drilling positioning, tool track, collision control, and definition of drilling sequences
+ Editing of the CNC programs during simulation possible

**LASERSOFT PowerShape**
+ Production of shaped hole geometries via laser ablation
+ Transfer of workpiece positioning data from the PowerDrill machine
+ Automatic programming of complete turbine blades from 3D CAD data

**LASERSOFT Weld**
+ Special software for laser welding of cover sheets
+ Teach-in mode for defining welding points
+ Automatic contour recognition via CCD image data processing

**LASERSOFT Combustor**
+ SynchroDrilling: Laser drilling during component rotation, single & multi-pulse operation possible and user-friendly parameterized programming system with 3D simulation
+ PatternDrilling: Laser drilling of segments and single rows possible

**LASERSOFT PartProbing / PartMapping**
+ Measuring of rotation symmetrical components via a capacity sensor
+ Automatic compensation via axial and radial displacement
LASERTEC Series

Floor Plans

LASERTEC 20 Work area
Front view

LASERTEC 20 Work area
Top view

LASERTEC 40 Work area
Front view

LASERTEC 40 Work area
Top view

LASERTEC 50 Work area
Front view

LASERTEC 50 Work area
Top view

Applications and Parts
Machine and Technology
Control Technology
Technical Data
- Floor Plans
Progress Through Innovation

Turnkey offering with impressive technology expertise.

In addition to the actual machine production, SAUER LASERTEC also offers the required application expertise in all four technology areas and supports customers with feasibility studies, process optimization as well as complete turnkey solutions. SAUER GmbH also regularly hosts LASERTEC Technology Seminars for customers and interested parties on the latest machines in a modern LASERTEC Showroom located in Pfönten, Germany.

LASERTEC Excellence

+ > 25 years of experience in laser precision machining
+ > 400 LASERTEC machines installed (worldwide)
+ Application and technology expertise: Training, customer support, complete turnkey solutions
+ Regular LASERTEC Technology Seminars

In addition, SAUER’s ULTRASONIC division in Stipshausen, Germany supports the economical machining of advanced materials (e.g. glass, ceramic, corundum, fiber composite materials) with reduced process forces to enable surface finishes of Ra < 0.000008 in.