LASERTEC SERIES

LASERTEC Shape
LASERTEC PrecisionTool
LASERTEC PowerDrill
PROGRESS THROUGH INNOVATION

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 LASERTEC product line focuses on three technological fields: Shape, PrecisionTool and PowerDrill. Depending on the application and component requirements, a range of laser sources such as YAG, fibre and femtosecond lasers can be used. User-specific software packages make it easier to work and program in the various fields of application.

Shape

Laser structuring of geometrically defined surfaces in plastic injection tools for mould making. 3D laser ablation for filigree cavities, engravings and inscriptions.
PresicionTool
Clearance angles, chip breakers, cutting edge roundings and guide chamfers in ultra-hard materials.

PowerDrill
High-precision 5-axis laser drilling of cooling holes in turbine components for aircraft engines and industrial gas turbines.
The right machine platform for every laser application

From a filigree embossing tool for the watch industry to a dashboard for cars, from small helicopter turbine blades to the combustor for large industrial gas turbines – LASERTEC has the right machine platform for every application. Depending on the customer application, laser source and programming software, the basic machines from DMG MORI are used for the different laser technologies.
**Highest accuracy – long-term stability**

All LASERTEC Series machines are based on a highly stable cast frame construction. The combination of precision construction and a direct positioning 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**

The latest generation of scanners combined with tailored precision optics for maximum precision and shortened machining times.
Applications and Parts
Machine and Technology
Control Technology
Technical Data

Flexible technology integration
Integration of a laser scanning head via the HSK-100 interface: A unique global selling point thanks to the intelligent combination 5-axis milling and laser texturing on one machine.

LASERTEC 210
Shape

Powerful control
Uniform control philosophy with SIEMENS 840D sl Operate. All LASERTEC machines (except of LASERTEC 45) are equipped with CELOS including 21,5" ERGO/line Control with multi-touch screen.

LASERSOFT software packages
Application-specific software packages facilitate the programming and operation of the machine. Customised programming systems allow easy creation of machine programmes based on CAD data. Complex processes can be depicted graphically in advance using simulation tools.
Application-specific laser sources available

<table>
<thead>
<tr>
<th>Model</th>
<th>LASERTEC 20</th>
<th>LASERTEC 45</th>
<th>LASERTEC 50</th>
<th>LASERTEC 80</th>
<th>LASERTEC 130</th>
<th>LASERTEC 75/125/210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-Switch/Fibre</td>
<td>-</td>
<td>20 Watt</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100 Watt</td>
</tr>
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<td></td>
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<td>Femtosecond</td>
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<td>20 Watt</td>
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<td>PowerDrill</td>
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<td>300 Watt</td>
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<td>100 Watt</td>
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<td>Nd:YAG</td>
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<td>500 Watt</td>
<td>500 Watt</td>
<td>500 Watt</td>
<td>300 Watt</td>
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<tr>
<td>QCW Fibre</td>
<td>-</td>
<td>-</td>
<td>3 - 18 kW</td>
<td>3 - 18 kW</td>
<td>3 - 18 kW</td>
<td>450 Watt</td>
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<tr>
<td>PrecisionTool</td>
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</table>

- not available
Applications and Parts

Machine and Technology
- 3D ablation
Control Technology
Technical Data

3D LASER ABLATION
1: Fine contours and filigree cavities

5-AXIS LASER TEXTURING
2: Design advantage for injection mould making
LASERTEC SHAPE WORKING PRINCIPLE

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

With the LASERTEC Shape Series, fine contours and filigree cavities for injection moulds, extrusion dies, inscriptions and other engravings can be consistently and reliably produced with the highest quality and minimal tool wear. Depending on the application, there are machine configurations with two laser sources featuring different ablation characteristics available: Fibre and ultra-short pulse laser. Depending on the material and laser source, walls up to max. 2 mm deep and surface quality of Ra < 0.2 μm is possible. The machine programme itself can be generated automatically from the 3D CAD data of the actual work piece. The optionally available LASERSOFT software packages simplify e.g. contour generation, lettering, logos and surface structuring in 3D surfaces, cylinders or free-form surfaces.
3D LASER ABLATION

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

HIGHLIGHTS / 3D LASER ABLATION

- Flexible for many applications: Engravings and inscriptions, coins and medals, extrusion dies, technical miniature moulds, injection moulds 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 the 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 programme will take into account the desired depth and draft angle to automatically generate the programme 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 a basic scanned document. 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. Furthermore, the creation of barcodes and QR codes is possible for component identification and tracking.

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

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

Design advantage for injection mould making

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

HIGHLIGHTS

- Realisation of individual, challenging 3D textures with free-form surfaces made from injection moulds
- The high machine precision makes excellent contour sharpness and consistency possible via laser machining
- Contour parallel laser shaping: Laser focus follows the 3D contour of the work piece
- Laser lacquer removal with a track width of 40 μm possible
- Variable focus lens for fast positioning of the machining point in Z-direction
- Focusing lens with focal distances between 100 mm and 420 mm for different components and component accessibility

Automotive

1. Steering wheel cap: Honeycomb structure
2. Motor cover: Pyramid structure
3. Tire side wall: Carbon fibre structure
4. Glove compartment door: Combination of honeycomb / leather structure
5. Connecting rods: Cell structure
Consumer Goods

1. Blow moulds, 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 comprehensive, digital process chain

1. Milling the mould
2. Honeycomb and leather structure with transition
3. IGES of the 3D tool mould
4. Uniform transfer of the texture to the mould
5. 3D simulation of the CNC machining programme
6. Laser texturing of the surface structure
7. Finished structured injection mould
8. Finished plastic injection moulded part

LASER TEXTURING

The comprehensive, digital process chain – from the idea to the final, structured injection mould piece

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 standardised software tools. The 5-axis laser machining programme is generated completely automatically. Transitionless “patching” of even large visible surfaces and the contour-parallel lasering on complex 3D free-form surfaces opens unlimited possibilities for the design and implementation of individual repeatable surface structures.
EASY OPERATION WITH BITMAPS / 3 EASY ROUTES TO A PERSONALISED TEXTURE

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

“CONTOUR-PARALLEL LASER SHAPING” FOR QUICK PROCESS EXECUTION ON COMPLEX FORMS

Depending on the 3D contour of the work piece, the laser focus can be very dynamically moved on the Z-axis due to a variable focus lens. You no longer have to reposition the laser head or the work piece on the Z-axis for every new lasering trace, saving you significant time.

CENTRAL SUPPLY WITH TEXTURING INFORMATION FOR IDENTICAL RESULTS AROUND THE WORLD

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

“VARIABLE PATCH FIELD SIZES” WITH NO VISIBLE SEPARATION LINES

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 Patch Field Sizes” software aids this process.

The darker the colour, the deeper the ablation.
LASERTEC 45 SHAPE

High-precision 3D laser removal and texturing in a new dimension

The new LASERTEC 45 Shape impresses with highest versatility, a completely intuitive operating concept, a large work area, workpieces up to 400 kg and a fully integrated 5-axis machine. The user-friendly control surface with its touch screen enables simple operation and direct programming on the machine. Furthermore, programming of complex components is possible via offline programming at a separate workstation. The LASERTEC 45 Shape with its maximum process reliability and reproducibility enables the creation of geometrically defined surface structures, finest contours as well as filigree cavities for the production of injection moulds, press stamps, labels and engravings of top quality and without tool wear in 2D/3D shapes.

HIGHLIGHTS

+ Highly compact 5-axis machine concept with a large working area measuring 700 x 380 mm
+ Higher deposition rates thanks to the readjusted precision scanner system
+ 3D laser machining made possible by the integrated swivel/rotary axis with torque motors (optional)
+ 80% larger working area with the same space requirements plus 3 times higher dynamics with 60 m/min rapid traverse (compared to the LASERTEC 40)
+ An user-friendly user interface allows for intuitive programming via the touch screen
+ Operate 4.5 on SIEMENS 840D solutionline with 15“ touch screen
**LASERTEC 45 Shape**

<table>
<thead>
<tr>
<th>Working area</th>
<th>mm</th>
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</tr>
</thead>
<tbody>
<tr>
<td>X-axis</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>Y-axis</td>
<td>420</td>
<td></td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>485</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work table / workpiece</th>
<th>mm</th>
<th>840 x 420 / ø 320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table size (3-axes/5-axes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum table load (3-axes/5-axes)</td>
<td>kg</td>
<td>400/100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Miscellaneous</th>
<th>m/s²</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum acceleration on X/Y/Z</td>
<td></td>
<td>10/10/16</td>
</tr>
<tr>
<td>Machine dimensions W/D/H</td>
<td>mm</td>
<td>1,650 x 2,234 x 2,580</td>
</tr>
</tbody>
</table>

| Control               |       | SIEMENS 840D solution line with 15" touch screen |

1: Working area image with integrated NC swivel rotary table (optional), precision scanner optics, measuring sensor for calibration, CCD camera for X/Y orientation with ring light
2: Maximum precision with the inherently stiff and low-vibration column
3: 5-axis version – Fully integrated NC swivel rotary table (A axis -100° to +120° / 100 kg)
4: Also available in a 3-axis version with rigid table (840 x 420 mm / 480 kg)
LaserTEC 50 SHAPE

5-axis machining of challenging carbide tools using an ultra-short pulse laser

Thanks to its highly compact, stable design, in combination with the high-performance ultra-short pulse laser, the LaserTEC 50 is particularly suited to demanding 5-axis machining work involving the production of complex prototypes and special tungsten carbide workpieces. This means even surface finishes of $Ra < 0.2 \mu m$ can be achieved in tungsten carbide tools. The LaserTEC 50 Shape is available with a 20 watt femtosecond laser.

HIGHLIGHTS

+ Linear drives with acceleration $> 1g$
+ Highly dynamic torque motors in both rotary axes (B- and C-axis)
+ High positioning accuracy of $< 8 \mu m$
+ CCD camera and 3D measuring probe for fast setup
+ Massive, vibration dampening machine bed with 3-point support
+ User-friendly SIEMENS 840D solutionline CNC control (comes standard)
LASERTEC 50 Shape

### Working area

<table>
<thead>
<tr>
<th>Axis</th>
<th>mm</th>
<th>500</th>
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<tbody>
<tr>
<td>X-axis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y-axis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>mm</td>
<td>700</td>
</tr>
<tr>
<td>Table size (3-axis / 5-axis)</td>
<td>mm</td>
<td>400 x 500 (Work surface)</td>
</tr>
<tr>
<td>Max. table load (3-axis / 5-axis)</td>
<td>kg</td>
<td>150</td>
</tr>
<tr>
<td>A-/B-axis (swivel range)</td>
<td>Degrees</td>
<td>-100 to +160</td>
</tr>
<tr>
<td>C-axis (speed)</td>
<td>Degrees</td>
<td>360 ° continuous</td>
</tr>
<tr>
<td>Table size (5-axes)</td>
<td>mm</td>
<td>ø 200</td>
</tr>
<tr>
<td>Max. table load (5-axes)</td>
<td>kg</td>
<td>14</td>
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### Traverse Speed

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<tr>
<th>Traverse Speed</th>
<th>m/min</th>
<th>60 / 60 / 30</th>
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</thead>
<tbody>
<tr>
<td>Rapid traverse in X/Y/Z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceleration</td>
<td>g</td>
<td>1</td>
</tr>
<tr>
<td>Machine / Unit weight</td>
<td>kg</td>
<td>5,000</td>
</tr>
<tr>
<td>Footprint W/D/H</td>
<td>mm</td>
<td>3,700 / 4,250 / 2,400</td>
</tr>
</tbody>
</table>

### Control

SIEMENS 840D solutionline Operate with CELOS

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1: Clearly structured working area with optimal workpiece accessibility
2: Massive, consistently stable mineral composite column
3: Precision scanner, CCD camera and measuring sensor
4: High-precision laser machining of demanding, complex geometries on up to 5 axes
5: 5-axis laser machining of a tungsten carbide tool with an ultra-short pulse laser
LASERTEC 75 SHAPE

5-axis laser texturing with repeat accuracy as well as laser lacquer removal on one precision machine

The highly dynamic LASERTEC 75 Shape combines all the stability advantages of monoBLOCK design with the benefits of a quick swivel rotary table and is the most compact machine in its class, with a 7 m² footprint. Equipped with an optimally accessible, large work area and Travels of 750 x 650 x 560 mm (X/Y/Z), it can be used for a large number of different applications. Due to state-of-the-art hardware and software components, the LASERTEC 75 Shape enables economical machining on a completely new level.

HIGHLIGHTS

+ Highest texturing performance, thanks to most modern beam sources, machining scanner and software for scan speed of up to 4 m/s
+ Different laser sources for differing applications
+ Integrated NC swivel-/ rotary table (workpieces up to ø 840 mm and 520 mm height / 1,000 kg)
+ Highest stability and long-term accuracy, cooled drive motors and direct measuring systems in all axes
1: Highly stable and compact design
2: Increased workpiece accessibility, thanks to the integrated laser head in the spindle stock

**LASERTEC 75 Shape**

<table>
<thead>
<tr>
<th>Working area</th>
<th>LASERTEC 75 Shape</th>
<th>LASERTEC 125 Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel (X/Y/Z) mm</td>
<td>750/650/650</td>
<td>1,250/1,250/900</td>
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<tr>
<td>Max. work piece dimensions (5 axis) mm</td>
<td>840 × 520</td>
<td>1,200 × 700</td>
</tr>
<tr>
<td>Max. load weight (5 axis) kg</td>
<td>600 (1,000')</td>
<td>2,000 (2,600')</td>
</tr>
<tr>
<td>Min. footprint (only machine) m²</td>
<td>ca. 7</td>
<td>ca. 18</td>
</tr>
</tbody>
</table>

**Control**

- SIEMENS 840D solution line Operate with CELOS
  - Option

Available with different laser sources and focal distances.
LASERTEC 210 SHAPE

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

LASERTEC 210 Shape provides a universal solution for 5 axis milling/laser complete machining of injection moulds up to 2.1m work piece sizes. Also, the laser head can be easily integrated into the milling spindle via the HSK-100 interface within 10 minutes. During the actual milling operation, all optical components of the laser are located outside the work area.

HIGHLIGHTS

+ Thermo-symmetrical structure and 3-point support for quick setup
+ Vertically traversable crossbeams featuring hydraulic weight compensation for the highest precision and dynamics
+ Machining of work pieces up to 8t (optional: 10t)
+ Laser scanner with focusing lens with focal distances up to 420 mm
+ Beam sources up to 200 watt output power
+ Variable focusing lens with travel speeds up to 4 m/s
LASERTEC 45 Shape
LASERTEC 50 Shape
LASERTEC 75 Shape
LASERTEC 125 Shape
LASERTEC 210 Shape

3D ablation
−
−
−
−
−

Engraving
−
−
−
−
−

Texturing of injection molds
−
−
−
−
−

Chip breakers in tungsten carbide
−
−
−
−
−

Chip breakers in PCD
−
−
−
−
−

• Standard

<table>
<thead>
<tr>
<th>LASERTEC 210 Shape</th>
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**Working area**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>LASERTEC 210 Shape</th>
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</thead>
<tbody>
<tr>
<td>Travel (X/Y/Z)</td>
<td>mm</td>
</tr>
<tr>
<td>Max. work piece dimensions (5-axis)</td>
<td>mm</td>
</tr>
<tr>
<td>Max. load weight (5-axis)</td>
<td>kg</td>
</tr>
<tr>
<td>Min. footprint (only machine)</td>
<td>m³</td>
</tr>
<tr>
<td>Rapid traverse in X/Y/Z</td>
<td>m/min</td>
</tr>
</tbody>
</table>

**Control**

SIEMENS 840D solutionline Operate with CELDS

1+2: Replacement of the laser scanning head via a special changer device within 10 minutes; interface is the HSK-100 taper of the spindle
3: Laser texturing of a housing component
4: Surface structures in engine covers
Reliable production of precision tools

PERFECT CUTTING EDGES

Clearance angles, chip breakers, defined cutting edge roundings and guide chamfers in ultra-hard materials
LASERTEC

With the laser into a new dimension of cutting edge / precision tool machining

Where conventional machining processes, such as grinding and eroding have a negative effect on cutting-edge quality – this is where the innovative laser technology has its unique strengths and numerous benefits. As a pioneer and market leader in the processing of ultra-hard materials, DMG MORI has many years of experience in laser machining of PCD, CVD-D and CBN as well as tungsten carbide. New laser sources with high energy efficiency mean that no consumable materials are required. This is why we talk about green technology for tool production. Leading tool manufacturers, OEMs and tier 1 suppliers use these machines to globally produce high-end precision tools for the industrial sectors automotive, aerospace, electronics, optics and wood cutting in 24/7 operation.
The laser provides unique advantages compared to grinding and eroding technology

On account of the constantly growing demand for ultra-hard precision tools, all tool manufacturers are faced with the challenge of continuously and sustainably optimising their production processes. The laser machining technology has proven to be the most efficient and process reliable solution for this purpose. This results in perfect cutting edges so that the tools in operation achieve up to two and a half times the life of conventionally manufactured tools.
Perfect tools by means of laser technology

**LASERTEC 20 PrecisionTool / PreCut**
Separating cutting inserts and rear chamfer machining from PCD / CVD-D and CBN

**LASERTEC 20 PrecisionTool**
Cutting edges, clearance angles, chip breakers and guide chamfers in PCD / CVD-D and CBN

<table>
<thead>
<tr>
<th>Applications in PCD / CVD-D / CBN</th>
<th>LASERTEC 20 PrecisionTool / PreCut</th>
<th>LASERTEC 20 PrecisionTool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation of cutting inserts</td>
<td>•</td>
<td>–</td>
</tr>
<tr>
<td>Geometric pre-machining of cutting edges</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Rear chamfer machining of cutting inserts</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Cutting edges with clearance angles</td>
<td>–</td>
<td>•</td>
</tr>
<tr>
<td>Defined cutting edge roundings</td>
<td>–</td>
<td>•</td>
</tr>
<tr>
<td>Guide chamfers for drilling tools</td>
<td>–</td>
<td>•</td>
</tr>
<tr>
<td>Chip breakers and negative chamfers</td>
<td>–</td>
<td>•</td>
</tr>
</tbody>
</table>

* Standard – not available
Separation and geometric pre-machining

Highly dynamic separation and geometric pre-machining from ultra-hard materials, >10x faster than wire eroding. The modular machine concept with optionally three, four or five CNC-controlled axes enables highly dynamic separation of cutting inserts from circular blanks, rear chamfer machining and geometric pre-machining of clearance angles and cutting edges.

MACHINE DESIGN

- Long-term stability: Polymer concrete base frame
- Dynamics: Latest linear / torque technology
- Precision: Positioning accuracy in the μm range
- Versatility: 5-axis version for pre-cutting of clearance angles

TECHNOLOGY

- Clean, accurate cutting
- Conicity with 3.2 mm material thickness only 25 μm per side
- Low marginal zone damage from 50 μm
- Cutting speeds up to 100 mm/min in 1.6 mm PCD of clearance angles
LASERTEC 20 PrecisionTool / PreCut

Machine versions with three, four or five CNC-controlled machine axes

3-axis machine version

4-axis machine version

5-axis machine version

<table>
<thead>
<tr>
<th>Separation of cutting inserts from circular blanks</th>
<th>Rear chamfer machining on tungsten carbide substrate</th>
<th>Cutting edge and clearance angle pre-machined</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Chamfer machined at the rear on the tungsten carbide of a PCD cutting insert</td>
<td>No need for manual rework</td>
<td>Cutting insert soldered onto a tool body</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LASERTEC 20 PrecisionTool / PreCut</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-axis</td>
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<tr>
<td>--------</td>
</tr>
<tr>
<td>Separation of cutting inserts</td>
</tr>
<tr>
<td>Rear chamfer machining on tungsten carbide substrate</td>
</tr>
<tr>
<td>Cutting geometry and clearance angle pre-machining</td>
</tr>
</tbody>
</table>
LASERTEC 20

LASERTEC 20 PrecisionTool

The LASERTEC 20 PrecisionTool combines dynamic performance, precision, compactness, versatility and intelligence in a high-tech machine. 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 gantry design as well as excellent positioning- and repeatability-accuracy make the LASERTEC 20 ideal for high-tech manufacturing of precision tools.

HIGHLIGHTS

+ Highly dynamic 5-axis precision machine in the gantry design with 5μm positioning accuracy
+ Compact with a 3.5 m² footprint
+ Highly dynamic through linear drives in the X-, Y-, Z-axis with > 2 g
+ Integrated swivel rotary table (4th / 5th axis come standard) with torque technology, −15° / +130°
+ Precision cooling in all axes
+ Maximum workpiece size: ø 200 × 344 mm (may be limited by the position of the C-axis)
+ CELOS with SIEMENS 840D solutionline
+ Non-contact precision work without tool wear
+ LASERSOFT software packages for laser machining of cutting inserts and turning tools, shank and monolithic tools
+ Introduction of chip grooves
+ Newly integrated technologies:
  − Cutting edge radius < 1 μm to 9 μm
  − Surface qualities up to Ra < 0.1 μm
  − Machining speed 1–2 mm per minute
5-axis machine version with integrated A-/C-axis

1: Working area: laser head with new precision scanner and integrated infrared measuring sensor, HSK-63 interface integrated into the machine table

2: Laser machining a PCD thread milling cutter

Long-term Stability
Stable, vibration-dampening cast mineral stand (approx. 3 t) in the gantry design with a compact 3.5 m² footprint.

Linear Technology
Linear drives with >2 g max. acceleration as well as precision cooling in X/Y/Z (comes standard) / 60-month warranty.

3D Work Piece Measuring
High-precision tool measurement and workpiece positioning in the working area with the infrared measuring sensor.

Zero Point Clamping System
Highest repeat accuracy with HSK interface. Choice of sizes 63, 80, 100.
Applications and Parts
Machine and Technology
› Automation
› Software packages
Control Technology
Technical Data

1: Clear structured, high compact working room with optimal accessibility and integrated NC swivel-/rotary table
2: High compact, integrated linear magazine PH10|100 for handling of indexable inserts, shaft- as well as HSK-tools
3: Handling of cutting inserts, shaft tools and monolithic tools

The integrated PH 10|100 automation solution allows automated loading of up to 42 HSK tools.

HIGHLIGHTS AUTOMATION
+ Compact linear magazine with the best accessibility and work piece automation from above
+ Max. 42 HSK tools with up to 15 kg total weight
+ Dynamic pallet change in < 30 seconds
+ Option: Interchangeable grippers on the handling arm e.g. for HSK
LASERSOFT PRECISION TOOL SOFTWARE PACKAGES

User-friendly software features

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 parameterised input of the cutting curve for a highly efficient and productive laser machining.

+ Programming of simple end mills to complex step tools
+ DXF interface for the input of the outer contour
+ Free definition of relief angle form and clearance angle for each contour element
+ Automatic measurement of the axial and radial position of the cutting inserts with automatic programme adjustment
+ Defined cutting edge roundings < 1µm to 9 µm
+ Guide chamfers for drilling tools
**LASERSOFT Precision**

**Turning Tools Advanced**

- For individual indexable inserts geometries
- Programming of indexable inserts via DXF interface
- Automatic measurement of the cutting curve

**LASERSOFT Precision**

**ChipBreaker Advanced**

- Automatic programming of the chip breakers, starting from the 3D-model or by definition of the cross section geometry
- Programming directly on the machine
- Production of negative chamfers
**Technical Data**

<table>
<thead>
<tr>
<th><strong>Work area</strong></th>
<th>PrecisionTool/PreCut</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis</td>
<td>mm 200</td>
</tr>
<tr>
<td>Y-axis</td>
<td>mm 400</td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>mm 280</td>
</tr>
<tr>
<td>Table size (3-axes)</td>
<td>mm –</td>
</tr>
<tr>
<td>Max. table load (3-axes)</td>
<td>kg –</td>
</tr>
<tr>
<td>A-axis (swivel range)</td>
<td>Degrees -15 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>mm ø200</td>
</tr>
<tr>
<td>Max. table load (5-axes)</td>
<td>kg 15</td>
</tr>
</tbody>
</table>

**Traverse Speed**

| Rapid traverse in X/Y/Z        | m/min 40/40/40 |
| Acceleration                   | g > 2         |

**Connection Load and Aggregate**

| Connection power [incl. aggregate] | kVA max. 40 |
| Operating voltage V/Hz            | 400/50 |
| Machine/Unit weight kg            | 3,750 |
| Machine dimensions W/D/H mm       | 2,200/2,020/2,200 |
| Extraction dimensions W/D/H mm    | 340/660/1,400  |
| Footprint W/D/H mm                | 2,568/2,462/2,383 |

**Control**

| SIEMENS 840D solutionline Operate | • |

**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 [centre of HSK intake to centre]</td>
<td>mm</td>
<td>95</td>
</tr>
<tr>
<td>Max. tool dimensions</td>
<td>mm</td>
<td>85</td>
</tr>
<tr>
<td>Max. tool length [from the HSK flange contact]</td>
<td>mm</td>
<td>240</td>
</tr>
</tbody>
</table>

*Tool length is max. 135 mm  **Tool length is max. 240 mm*
STATE-OF-THE-ART

Technology leader in 5-axis precision drilling of cooling air holes for aerospace and industrial gas turbines (IGT)
Cooling air holes in turbine components for aerospace and power generation

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

+ 5-axis laser precision drilling of components from the sectors aerospace and stationary gas turbines
+ Creation of cooling air holes by means of percussion, trepanning or drilling on the fly
+ Precise 5-axis simultaneous machining with partly conical and cylindrical shape in turbine guide vanes/rotor blades, burners and combustion chambers
+ PowerDrill software tools enable convenient programming and machining of complex components.

<table>
<thead>
<tr>
<th>Turbine Vanes</th>
<th>LASERTEC 50 PowerDrill</th>
<th>LASERTEC 80 PowerDrill</th>
<th>LASERTEC 80 PowerShape</th>
<th>LASERTEC 130 PowerDrill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft engines</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Industrial gas turbine</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turbine Blades</th>
<th>LASERTEC 50 PowerDrill</th>
<th>LASERTEC 80 PowerDrill</th>
<th>LASERTEC 80 PowerShape</th>
<th>LASERTEC 130 PowerDrill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft engines</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Industrial gas turbines</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cover sheets, Heat shields</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Combustors, Burners, Reducers</th>
<th>LASERTEC 50 PowerDrill</th>
<th>LASERTEC 80 PowerDrill</th>
<th>LASERTEC 80 PowerShape</th>
<th>LASERTEC 130 PowerDrill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft engines</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Industrial gas turbines</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

*Up to ø 450 mm (17") ** Up to ø 1,300 mm (51")
Highly dynamic 5-axis laser precision machine with linear drives

The LASERTEC 50 PowerDrill is a highly dynamic laser precision machine capable of handling challenging 5-axis machining 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 high flexibility along with numerous application-specific machine options and laser sources enable universal use of this machine size in almost all LASERTEC-technology fields. With a footprint of only 4 m² and relatively large work area featuring travels of 500 x 500 x 700 mm in X/Y/Z, this machine not only stands out with its high dynamics, precision, flexibility and long-term stability, but also with its optimal accessibility and compactness.

**HIGHLIGHTS**

- Linear drives with acceleration > 1g
- Highly dynamic torque motors in both rotary axes (B- and C-axis)
- High positioning accuracy of < 8μm
- CCD camera and 3D measuring probe for fast setup
- Massive, vibration dampening machine bed with 3-point support
- SIEMENS 840D solutionline Operate with CELOS with special LASERSOFT PowerDrill software features
- Low space requirement with 4 m² footprint
Clearly structured working area with optimal workpiece accessibility

Laser nozzle with quick-change interface

Laser precision drilling of cooling air holes

Drilling-on-the-fly with up to 20 boreholes per second

The linear motors and the laser are outside of the work area

<table>
<thead>
<tr>
<th>Working area</th>
<th>PowerDrill / PowerShape</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis</td>
<td>mm 500</td>
</tr>
<tr>
<td>Y-axis</td>
<td>mm 500</td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>mm 780</td>
</tr>
<tr>
<td>Table size (3-axes)</td>
<td>mm 400 \times 500 (Work surface)</td>
</tr>
<tr>
<td>Max. table load (3-axes)</td>
<td>kg 150</td>
</tr>
<tr>
<td>A-/B-axis (swivel range)</td>
<td>Degrees -100 to +160</td>
</tr>
<tr>
<td>C-axis [speed]</td>
<td>Degrees 360 ° continuous</td>
</tr>
<tr>
<td>Table size (5-axes)</td>
<td>mm ø 200</td>
</tr>
<tr>
<td>Max. table load (5-axes)</td>
<td>kg 14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Traverse Speed</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid traverse in X/Y/Z</td>
<td>m/min 60 / 60 / 30</td>
</tr>
<tr>
<td>Acceleration</td>
<td>g 1</td>
</tr>
<tr>
<td>Machine/Unit weight</td>
<td>kg 5,000</td>
</tr>
<tr>
<td>Footprint W/D/H</td>
<td>mm 3,700 / 4,250 / 2,400</td>
</tr>
</tbody>
</table>

Control
SIEMENS 840D solutionline Operate with CELLS
High positioning accuracy and dynamics of the X-/Y-axis, the Z-axis as a ball screw drive and rotary axes in the torque technology are just some of the LASERTEC 80 PowerDrill highlights. The X-/Y-cross table with direct drives and a massive machine bed with three-point support provide high-precision 5-axis laser machining.

The LASERTEC 130 PowerDrill sets the standard for drilling large turbine components. Two highly dynamic torque motors in the component axis of rotation and the laser head ensure the highest precision and fast processing. With the integrated focusing head changer, the LASERTEC 130 PowerDrill has a wide range of applications, including aerospace/power generation as well as 5-axis laser drilling for sizes up to 1,300 mm.

**LASERTEC 80/130 PowerDrill**

**Strong performance for the laser machining of turbine components up to XXL**

HIGHLIGHTS

- 5-axis laser precision milling 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
- High-precision fibre laser or Nd: Yag laser
- CCD camera and 3D measuring probe for fast setup
- SIEMENS 840D solutionline Operate with CELOS with special LASERSOFT PowerDrill software features
- Also available as a PowerShape machine version for producing shaped hole geometries
**HIGHLIGHTS**

+ Highly dynamic 5-axis laser drilling of cooling air holes in combustors, vanes and blades (up to max. 1,300 mm)
+ 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 (synchronised laser drilling with a rotating component)
+ Drilling on the fly: Synchronisation between continuous axis movement and laser pulses for minimising positioning times
+ SIEMENS 840D solutionline Operate with CELOS with special LASERSOFT combustor software features

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### LASERTEC 80
**PowerDrill / PowerShape**

<table>
<thead>
<tr>
<th>Working area</th>
<th>LASERTEC 80</th>
<th>LASERTEC 130</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis</td>
<td>800</td>
<td>1,250 / 1,250 / 900</td>
</tr>
<tr>
<td>Y-axis</td>
<td>500</td>
<td>920</td>
</tr>
<tr>
<td>Z-axis (focusing axis)</td>
<td>700</td>
<td>820</td>
</tr>
<tr>
<td>Table size (3-axes)</td>
<td>900 x 600</td>
<td>-</td>
</tr>
<tr>
<td>Max. table load (3-axes)</td>
<td>200</td>
<td>-</td>
</tr>
<tr>
<td>B-axis (swivel range)</td>
<td>±100 to ±150</td>
<td>±150</td>
</tr>
<tr>
<td>C-axis (turning range)</td>
<td>360° continuous</td>
<td>360° continuous</td>
</tr>
<tr>
<td>Table size (5-axes)</td>
<td>ø200/400</td>
<td>ø450</td>
</tr>
<tr>
<td>Max. table load (5-axes)</td>
<td>14/40</td>
<td>100/500 (static)</td>
</tr>
</tbody>
</table>

### Traverse Speed

<table>
<thead>
<tr>
<th>Rapid traverse in X/Y/Z</th>
<th>m/min</th>
<th>120 / 120 / 30</th>
<th>30 / 30 / 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceleration</td>
<td>g</td>
<td>1.2 (X/Y)</td>
<td>0.5 (X/Y)</td>
</tr>
</tbody>
</table>

### Connection Load and Aggregate

| Connection power (incl. aggregate) | kVA | max. 72 | max. 92 |
| Operating voltage V/Hz | 400/50 | 400/50 |
| Machine / Unit weight kg | 7,000 | 18,000 |
| Footprint W/D/H mm | 4,500/6,000/2,300 | 7,450/6,100/3,378 |

### Control

- SIEMENS 840D solutionline
- •
- •
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 work piece 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.
- Customised number of measuring points possible
- Descriptive, graphical illustration
- Allows the use of simple work piece holders
- Consistently precise laser machining of high-quality components

**BREAK-THROUGH-DETECTION**

- Fully integrated optical sensor for automatic breakthrough 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 work piece
- Cycles for percussioning and trepanning
- 5-axis simultaneous machining of shaped drillings

**VERICUT Simulation**
- Graphical 3D simulation incl. drilling positioning, tool track, collision control, and definition of drilling sequences
- Editing of the CNC programmes during simulation possible
- Simple and fast simulation of different machining heads

**LASERSOFT PowerShape**
- Production of shaped hole geometries via laser ablation
- Transfer of work piece positioning data from the PowerDrill machine
- Automatic programming of complete turbine blade 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 parameterised programming system with 3D simulation
- PatternDrilling: Laser drilling of segments and single rows possible
- Drilling on the fly: Synchronisation between continuous axis movement and laser pulses for minimising positioning times

**LASERSOFT PartProbing / PartMapping**
- Measuring of rotation symmetrical components via a capacity sensor
- Automatic compensation via axial and radial displacement
- Mapping of workpieces with ceramic coating
LASERTEC SERIES

Floor plans

LASERTEC 20
Front view

Top view

LASERTEC 45
Front view

Top view

Coolant unit

Floor plans
PROGRESS THROUGH INNOVATION

Turnkey provider with impressive technology expertise

In addition to the actual machine production, SAUER LASERTEC also offers you the required user expertise in all three technology areas and supports customers with feasibility studies, process optimisation as well as turnkey developments. SAUER GmbH also regularly hosts LASERTEC Technology Seminars for customers and interested parties on the latest machines in a modern LASERTEC Showroom in Pfronten.

LASERTEC EXCELLENCE

+ > 25 years of experience in laser precision machining
+ > 700 LASERTEC machines installed (worldwide)
+ Application and technology expertise: Training, customer support, complete turnkey solutions
+ Regular LASERTEC Technology Seminars

SAUER ULTRASONIC in Stipshausen supports the economical machining of advanced materials (e.g. glass, ceramic, corundum, fibre composite materials) with reduced process forces to enable surface quality of Ra < 0.1µm.
Customer First –
Our service promise!

“We have good news for you: Our service and spare parts prices have been completely revised. With our service commitments, we want to meet your high demands with the highest service quality.”

Please contact us – your sales and service team is at your disposal!

Top quality at fair prices. It’s a promise!

Best Price Guarantee for Original Spare Parts. Should you get a spare part offered by us at least 20% cheaper elsewhere, we will refund the price difference up to 100% *.

Spindle service at best prices. The highest level of competence from the manufacturer at new and attractive prices – DMG MORI spindle service!

Up to 50% lower service costs. New Flat Call-Out Rate – without travel expenses or any additional costs!

Our protective shield for your productivity. Reduced operating costs, highest machine availability and maximum precision – DMG MORI Service Plus!

* All information and price advantages for Customer First are available at: customer-first.dmgmori.com