

**DMG MORI**

LASERTEC Shape  
LASERTEC PrecisionTool  
LASERTEC PowerDrill

PROGRESS THROUGH INNOVATION

## LASERTEC Series



PROGRESS THROUGH INNOVATION

# LASERTEC – The next generation of 3D laser machining

The LASERTEC product line concentrates on three fields of technology: Shape, PrecisionTool and PowerDrill. In doing so, it opens up new economic opportunities in laser precision machining. The range of applications includes the removal of filigree cavities, the production of finest engravings and structures as well as sharpening of the cutting edge of diamond tools and the drilling of precise cooling holes by lasers. The materials to be machined range from aluminum, steel, Inconel up to high-tech materials such as tungsten carbide, ceramics and diamond (PCD / CVD).

Various laser sources, such as nanosecond and ultrashort pulse lasers, are used depending on the application. The application-specific software packages facilitate operation and programming for the different fields of application.

In addition to the LASERTEC technology fields of Shape, PrecisionTool and PowerDrill, DMG MORI offers LASERTEC machines for SLM (Selected Laser Melting) and DED (Directed Energy Deposition) processes as a hybrid solution via the Additive Manufacturing product line.

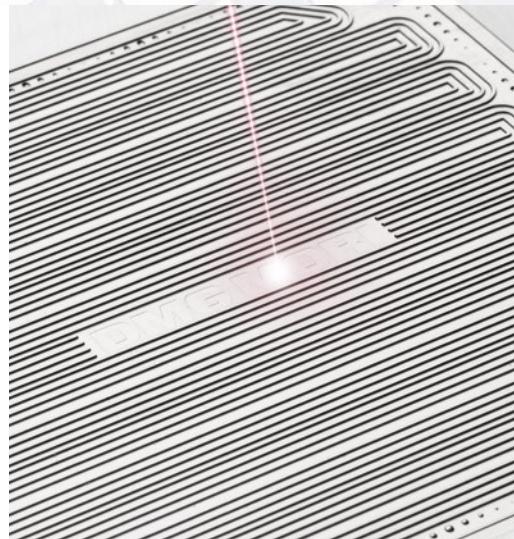
## HIGHLIGHTS

- + Pioneer of laser material machining with more than 30 years of expertise
- + Substitution of conventional machining processes such as micro-milling, eroding or grinding by laser processing
- + Non-wearing and noncontact machining of diverse materials such as tungsten carbide, ceramic or diamonds
- + Maximum machining precision and reproducibility thanks to a solid machine base and stable processes
- + Unique application technology know-how to implement your turnkey applications

## Shape

3D precision laser ablation for the production of technical miniature moulds, press punches, moulds, dies and embossing tools.

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## Precision Tool

Laser cutting of cutting edges including clearance angles, chip breakers, cutting edge rounding through to round chamfering in PCD/CVD.

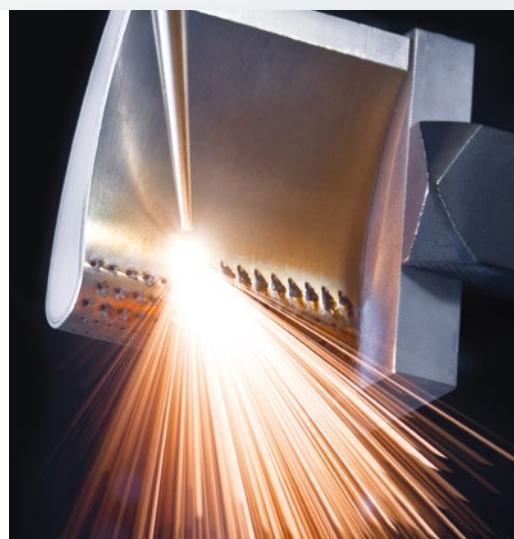
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## Power Drill

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

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LASERTEC SERIES

## The right machine platform for every laser application

From filigree and precise forming punches for toolmaking to the removal of structures in SiC wafers, from standard indexable inserts to complex combination tools and reamers, from small turbine blades to combustion chambers for large industrial gas turbines – LASERTEC offers the right machine platform for every application.



### LASERTEC 20

PrecisionTool

### LASERTEC 50

Shape  
PrecisionTool  
PowerDrill



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## LASERTEC 100/160

PowerDrill

### APPLICATION-SPECIFIC LASER SOURCES

	Shape		PrecisionTool		PowerDrill
	Nano	Femto	Nano	Femto	Nano
LASERTEC 20	-	-	100 Watt	-	-
LASERTEC 50	100 Watt	20 Watt	100 Watt	20 Watt	3–30 kW
LASERTEC 100/160	-	-	-	-	3–30 kW

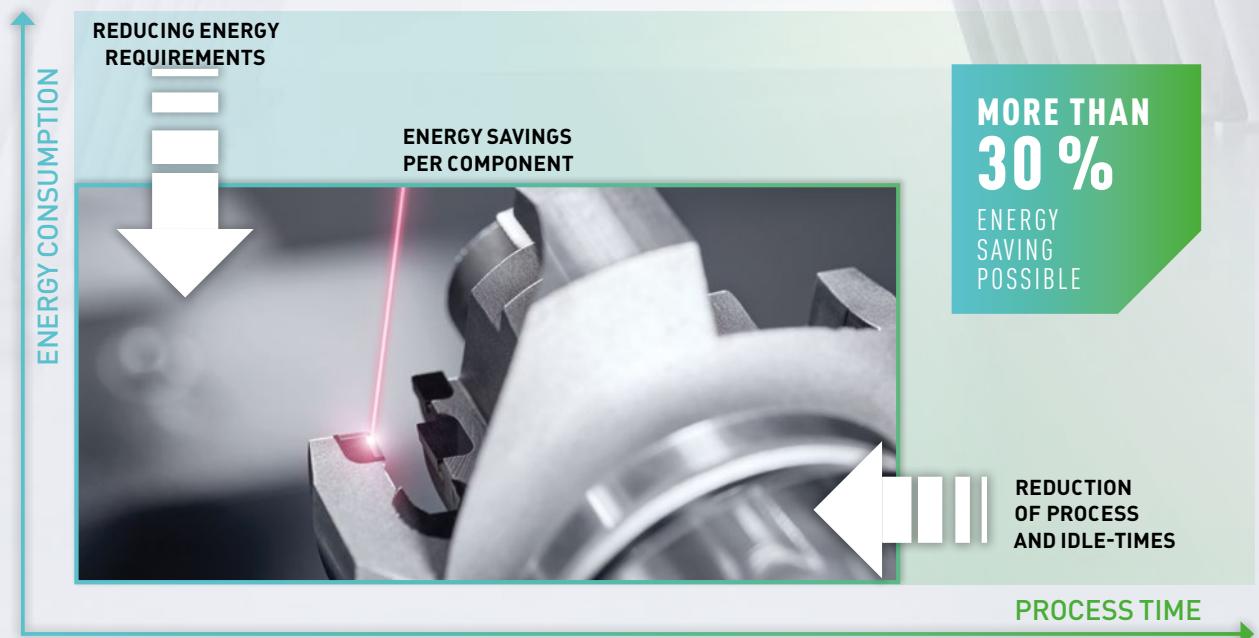
- not available

Integration of special laser sources on request

ENERGY-EFFICIENT MACHINE TOOLS

## GREENMODE – sheer energy efficiency

Increasing energy efficiency in industry is an important factor for achieving climate protection targets. Furthermore, a low energy requirement is becoming increasingly economically important due to the increasing energy prices. DMG MORI is redefining energy efficiency in manufacturing with **GREENMODE**. Considerable savings can be made, particularly in process and machine cooling, which often amount to as much as 70 % of the power consumption of a machine tool. DMG MORI has succeeded in reducing the energy requirement by more than 30 % using innovative hardware and software components. In this way, DMG MORI helps you on the way to energy-efficient production.



### Measures for better energy efficiency

- + Braking energy regeneration
- + LED lighting
- + High-efficiency coolers  
Best-in-class cooling units
- + Advanced Auto Shutdown  
Automatic Standby & Wake-up
- + Adaptive infeed control  
Shorter machining times
- + Advanced Energy Monitoring  
Component-specific energy measurement
- + Compressed air monitoring  
Quick leak detection
- + Business Benefit Optimizer  
Transparent comparison of performance and CO<sub>2</sub> emissions during machine selection

# -12%\*

WITH GREENMODE  
49,320 kWh/a

**-6,654 kWh/a**



WITHOUT GREENMODE  
55,974 kWh/a

1. STAND-BY	2. WARM-UP	3. NC-READY	4. MACHINING	5. EMERGENCY STOP
<b>Δ -18 %</b>	<b>Δ -4 %</b>	<b>Δ -10 %</b>	<b>Δ -10 %</b>	<b>Δ -74 %</b>
Reference <b>GREENMODE (ECO)</b> 7.8 kW 4.4 kW	Reference <b>GREENMODE</b> 15.77 kW 15.12 kW	Reference <b>GREENMODE</b> 8.3 kW 7.0 kW	Reference <b>GREENMODE</b> 19.1 kW 17.1 kW	Reference <b>GREENMODE (ECO+)</b> 3.5 kW 0.9 kW

## Savings during operation – example calculation

Machine run-time: 4,000 hours per year (16 hours per day, 250 days per year)

Machine status	Standby	NC ready	Machining
Time distribution	20 %	20 %	60 %
Average power consumption without <b>GREENMODE</b>	7.8 kW	8.3 kW	19.1 kW
Average power consumption with <b>GREENMODE</b>	6.4 kW	7.0 kW	17.4 kW

**CO<sub>2</sub> SAVING**

**2.888 kg/a**

**COST SAVING**

**799 €/a**

\*All values shown are based on the internal examinations and experiences of DMG MORI. The actual values may deviate from these because of the actual production conditions. Assumptions for annual energy requirement: 250 working days per year, 2 shifts per day, 8 hours per shift, 20 % standby, 20 % NC-ready, 60 % machining, CO<sub>2</sub> emission factor: 0.434 kg/kWh, electricity price: 0.12 €/kWh.

# LASERTEC Shape

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## HIGH-PRECISION LASER ABLATION

The economical alternative to eroding or chemical etching.

Example: Wafer chucks made of SiC (silicon carbide) µm precise laser ablation of fine structures

Industry: Semiconductor



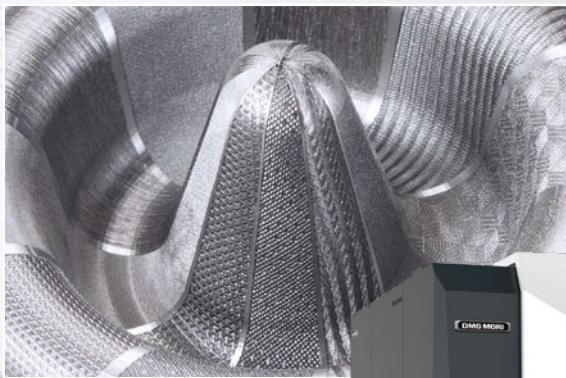
LASERTEC Shape

# Filigree 3D-laser ablation – unrivalled precision and quality

With maximum process reliability and reproducibility, the LASERTEC Shape Series enables you to produce geometrically defined structures, fine contours as well as filigree cavities for the production of forming tools, press punches, dies, injection moulds, inscriptions and other engravings can be produced in highest quality and outstanding precision without tool wear. Typical components are: Miniature moulds, SiC wafer chucks, pressing and forming dies with press-fit zones and bipolar plates for fuel cells. Depending on the application, two laser sources with different ablation characteristics are available for the machine configuration: Nanosecond and femtosecond lasers (ultrashort pulse lasers). Depending on the material and laser source used, contours up to a depth of approx. 2 mm and profile accuracies of 3 µm as well as surface qualities of up to Ra < 0.1 µm can be produced.

The machine program is able to independently and automatically generate the actual workpiece from the 3D CAD data. The optional LASERSOFT software package simplifies, e. g., the creation of contours, lettering, logos and surface structures on 3D surfaces, cylinders or free-form surfaces.

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## 5-AXIS LASER ABLATION

High-detail precision and reproducibility paired with efficient machining times



## 3D LASER ABLATION

Fine contours and filigree cavities

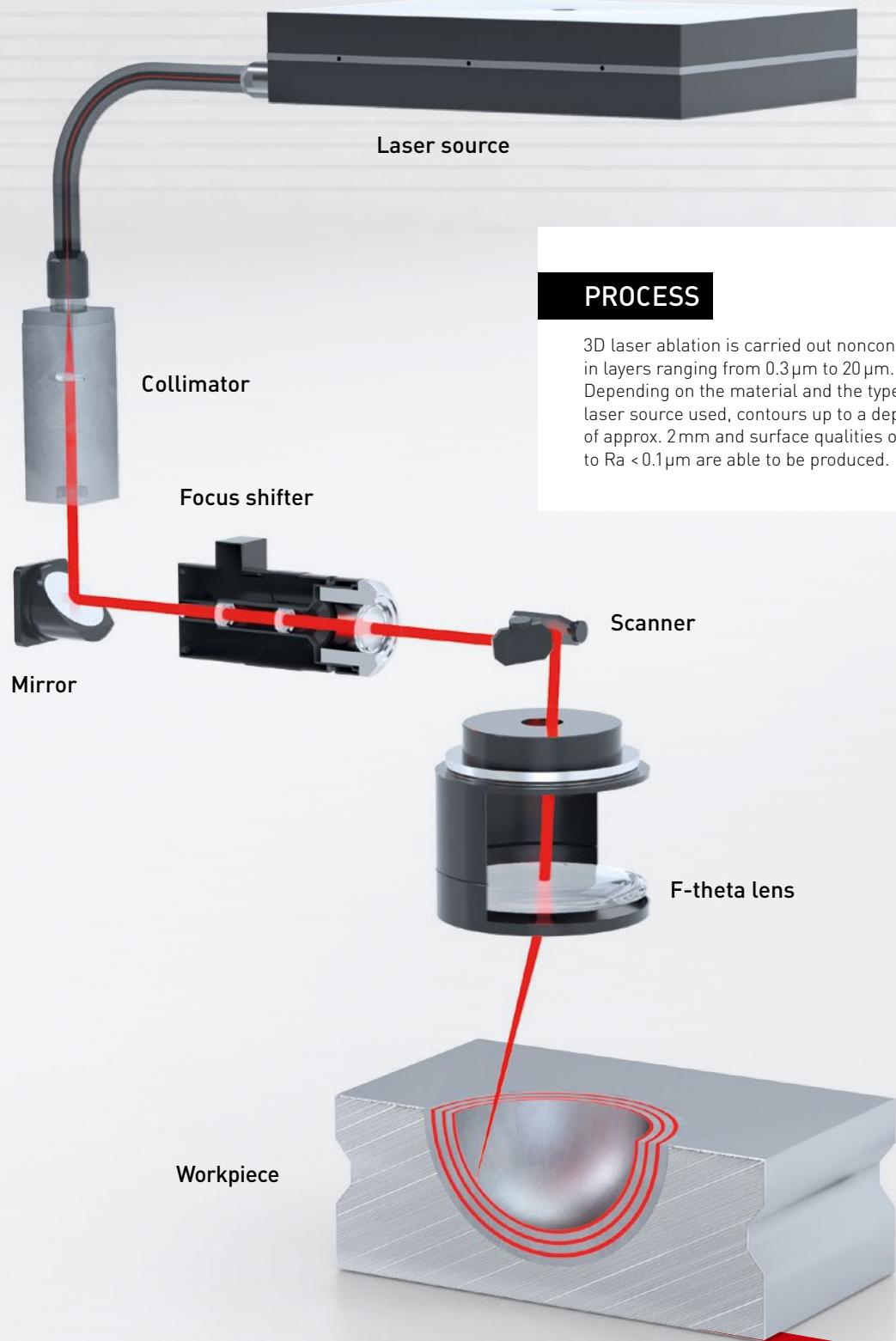
3D LASER ABLATION

# 3D laser ablation for the production of miniature moulds, press dies and forming tools, inscriptions and engravings

## HIGHLIGHTS / LASER ABLATION

- + **Laser processing of metal alloys through to advanced materials** such as glass, ceramics and hard metal (tungsten carbide)
- + **Non-abrasive, noncontact and smooth laser machining** of the end product without the need to produce electrodes for EDM process or the risk of tool breakage during micromilling
- + **CAD data – intuitive programming for minimum idle times**
- + **Flexible use** in numerous areas of application: Forming tools, press punches and dies, injection moulds, technical miniature moulds, component decorations, engravings and inscriptions

## LASERTEC Shape mode of operation



LASERTEC 50 Shape

# Unbeatable accuracy on the component with best surface qualities of Ra < 0,1 µm

The highly compact and stable LASERTEC 50 Shape enables the precise production of intricate components, prototypes and forming tools. The use of nano- or femtosecond lasers allows the flexible processing of numerous materials, including carbide and ceramics. Optimised calibration cycles ensure minimal shape deviations and the best edge radii. High scanning speeds of up to 8 m/s and contour-parallel laser ablation ensure an efficient process.



## HIGHLIGHTS

- + Machine can be configured with 3 axes, 4 axes or 5 axes
- + Max. Workpiece dimensions:  
500 × 500 mm, 120 kg (3-axis)  
300 × 350 mm, 14 kg/30 kg (5-axis)
- + Nanosecond or femtosecond lasers available
- + Tunable USP laser source with variable pulse length and burst modes
- + 3D measuring probe and CCD camera for fast set-up
- + Linear drives with acceleration >1g
- + Highly dynamic torque motors in both rotary axes (B- and C-axis)
- + Can be automated as standard with PH 50 or customised solutions



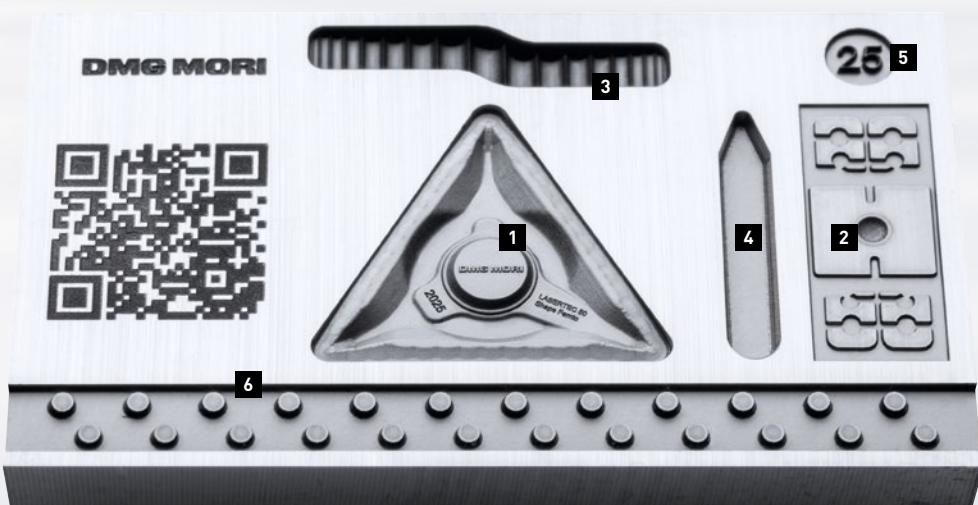
Femtosecond laser for cold,  
slag-free ablation with surface  
finishes up to Ra <0,1 µm

## Sample plate with application examples

Material: Carbide CF-H40S+

Dimensions: 15 x 25 x 2 mm

Cycle time: 1 h 45 min. (total)



**1: Pressing punch for indexable insert**

Tolerances in the µm range  
Flatness < 5 µm, Edge radius  
< 10 µm (depth 425 µm)

**2: Punching tool**

Ra 0.16 µm, (depth 465 µm)

**3: Forming tool**

Wall angle 8° (depth 750 µm)

**4: Punching tool**

Wall angle 7° – 9° (depth 500 µm)

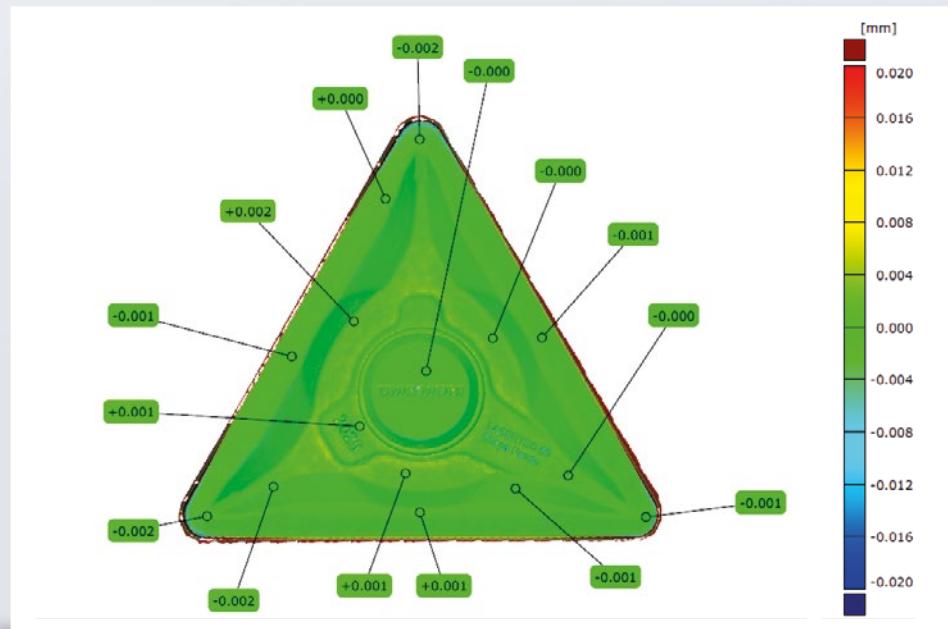
**5: Embossing tool**

Wall angle 9.5° (depth 200 mm)

**6: Waferchuck pins**

Pin height 250 µm, ø 300 µm

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Highest machining quality with  
best mould accuracy. Target/actual  
Comparison in all areas < 2 µm

LASERTEC 50 Shape with PH 50

## PH 50 – Pallet automation for maximum productivity

### HIGHLIGHTS

- + Most cost-effective pallet automation from DMG MORI
- + Small footprint – only 2.7 m<sup>2</sup> (1.6×1.7 m)
- + Pallet Master – for convenient and simple control of the automation directly via the machine control system
- + 3× NC axis for high flexibility and precision
- + Various pallet configurations possible:  
8 pallets with 200×200 mm each  
6 pallets with 320×320 mm each  
from Erowa, Schunk, System 3R, ...



Configuration with 30 pallets (ø 80×300 mm, max. 30 kg) from System 3R.

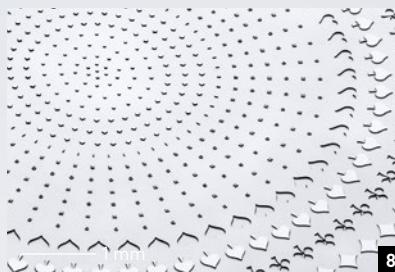
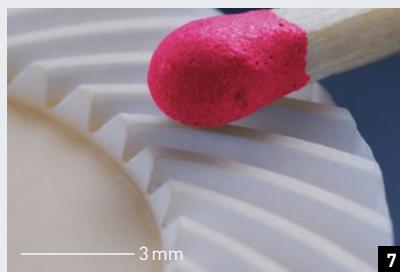


Handling of EROWA ITS pallets.



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## APPLICATION EXAMPLES



**1:** Clearly organized work area  
with optimal workpiece accessibility

**2:** Solid mineral-cast base offering  
long-term stability

**3:** Precision scanner, CCD camera  
and measuring probe

**4:** Tactile measuring probe for setup  
that is precise to the  $\mu\text{m}$

**5:** Progressive tool made of tungsten carbide

**6:** Pressing Tool for pills

**7:**  $\text{ZrO}_2$  gear wheel

**8:** SiC wafer chuck with fine structure

**9:** PCD micro-tool  $\varnothing 4\text{ mm}$ ,  
made from a cylindrical blank



LASERTEC Shape

# LASERSOFT 3D software features for the LASERTEC 50 Shape

Numerous software features are available for the LASERSOFT 3D Shape Pro to ensure you can optimally utilize the machine capabilities of the LASERTEC 50 Shape. They guarantee easy handling and fast and targeted laser machining. All software features are available directly on the machine control system and via an external programming station and enable the greatest degree of operator friendliness.

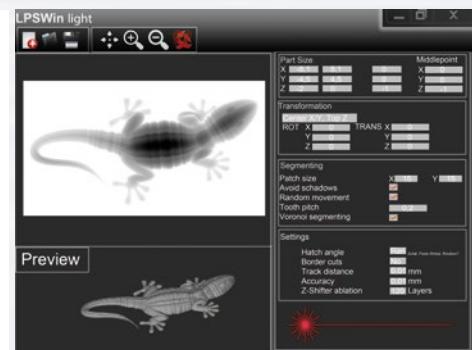
## 3D DRAFT ANGLE WITH DEFINED WALL ANGLE

The program for the laser machine is automatically generated based on the 2D CAD data in DXF format, taking into consideration the desired depth and draft angle. This means easy handling when creating engravings, logos, symbols, simple tools, etc.



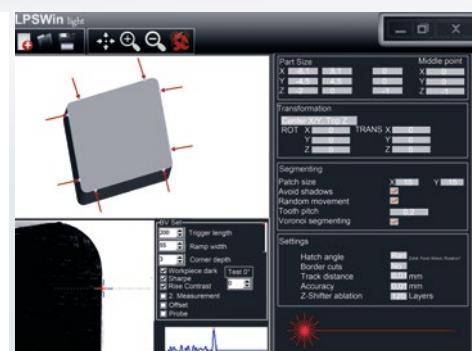
## 3D BITMAP GENERATOR

Different gray levels can be assigned to different depths based on the grayscale images in bitmap format. This allows 3D reliefs, surface structures, logos, etc. to be produced even on the basis of scanned paper templates. It is also possible to reduce the data volume by converting the STL data into bitmap data.



## AUTO VIDEO SETUP

Automatic calibration of clamped components including detected correction (displacement or rotation) of the corresponding component program. The built-in CCD camera searches for predefined measurement points to make automatic position corrections.



## 3D CYLINDER MACHINING

This feature allows you to machine cylinder and cone geometries. This can be combined with a rotary axis if required.



## 3D FREE SURFACE PROJECTION

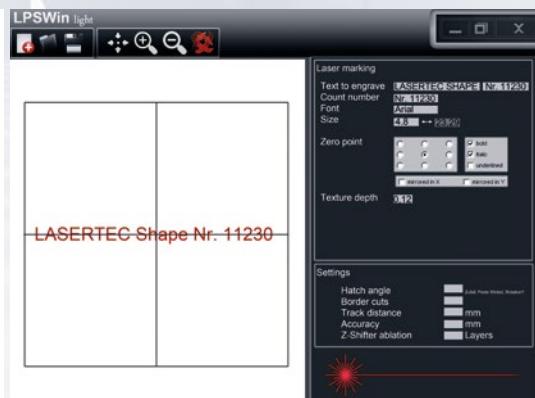
Vertical projection of the geometry to be machined on slightly inclined free-form surfaces. The machining geometry is extended depending on the angle of inclination of the projection surface.



## LASER MARKING

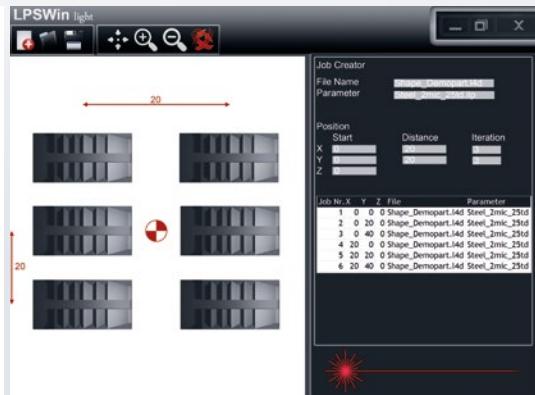
Inscriptions directly from the LASERSOFT 3D Shape Pro control software. You can select the text, font, gradient and other text attributes.

It is also possible to generate barcodes and QR codes for component identification and tracking.



## JOB CREATOR

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



# LASERTEC PrecisionTool

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## PERFECT CUTTING EDGES

Complete machining of diamond tools including clearance angles, chip breakers, defined cutting edge rounding in ultra-hard materials such as PCD and CVD. Reliable production of precision tools with up to **56 % lower costs per unit than using the eroding process.** Production of high-precision reamers with a laser-cut round chamfer possible.

# With the laser into a new dimension of machining cutting edges of precision tools

Where conventional machining processes, such as grinding and eroding have a negative effect on the quality of the cutting edge – this is where the innovative laser technology has its unique strengths and numerous benefits. As the pioneer and market leader in the machining 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.

By using state of the art, highly efficient laser sources, no consumables are required. This is why we talk about green technology for tool manufacture. Leading tool manufacturers, OEMs and tier 1 suppliers use DMG MORI LASERTEC machines to globally produce high-end precision tools for the industrial sectors automotive, aerospace, electronics, optics and wood cutting in 24/7 operation.



Automotive

Electronics

Aerospace

Optics

Woodworking

- + High Speed Mode 3.0: 210 % faster and 56 % lower costs per unit in comparison to the EDM
- + The finished cutting edge is machined at a speed of up to 3 mm/min, or up to 4 mm/min for straight profiles, regardless of the cutting plate oversize
- + Individual cutting edge machining – negative chamfers, <1 µm sharp cutting edge or a defined 3/6/9/12/15 µm cutting edge rounding
- + Production of **lasered round chamfers for reamers** possible
- + Flexible machining of PCD, PCBN, CVD, MCD
- + Flexible automation solutions: from PH 10 linear magazine for HSK tools and shank tools to PH 50 round storage solutions for large diameters or customised individual solutions

UP TO  
**210 %**  
FASTER THAN EDM  
**56 %**  
LOWER COSTS  
PER UNIT

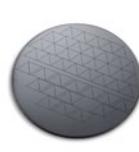
**EDM VS.  
HIGH SPEED MODE 3.0**



APPLICATION EXAMPLES

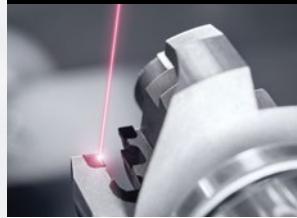
## The ideal solution for every task

### LASERTEC 20 FOR CUTTING



Separation of cutting segments and rear chamfer machining for PCD/CVD-D and CBN blanks

### LASERTEC 20 PrecisionTool / LASERTEC 50 PrecisionTool



Cutting edges, relief angles, chip breakers in PCD/CVD-D and CBN

### LASERTEC 50 PrecisionTool WITH FEMTOSECOND LASER



PCD microtools and carbide press punches

LASERTEC 20  
for cutting

LASERTEC 20  
PrecisionTool

LASERTEC 50  
PrecisionTool

LASERTEC 50  
PrecisionTool Femto

#### Application

Separation of cutting segments

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Geometry premachining of cutting edges

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Rear chamfer machining of cutting segments

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Cutting edges with relief angle

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Defined cutting edge rounding +  
extremely sharp cutting edge

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Round laser chamfer

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Chip breakers / negative chamfers

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Micro tools

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Tungsten carbide extrusion dies

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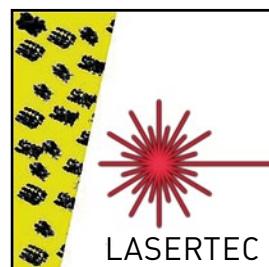
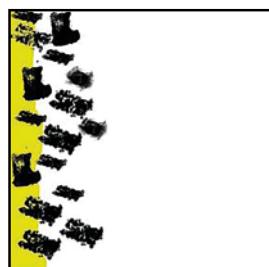
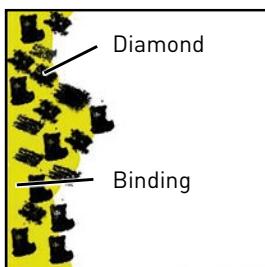
• Standard – not available

## TECHNOLOGY COMPARISON

# Lasers provide unique benefits compared to grinding and eroding technology

The ever-increasing demand for faces tools presents tool manufacturers with the challenge of optimising their manufacturing processes sustainably and economically. Faster machining times and unlimited design of freedom of the laser are therefore increasingly replacing grinding and eroding as a manufacturing process. DMG MORI's laser machining technology has emerged as the most efficient and process-reliable solution. The result is perfect cutting edges, which means that the tools in operation achieve up a 40% longer tool life than conventionally manufactured tools. Today, lasered tools have become 'state of the art' in the industry.

## TECHNOLOGY COMPARISON LASER VS. GRINDING AND ERODING



### GRINDING

- + Break-out of diamond grains
- + It is difficult to grind coarse-grained PCD grades
- + Chip breakers are not possible
- + Grinding disc wear limits the edge radius

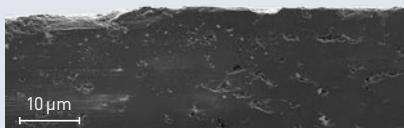
### ERODING

- + Diamond cannot be eroded, only binding material
- + Coarse-grained PCD grades are difficult to erode
- + Chip breakers are not possible
- + Wire diameter limits edge radius
- + The eroding process must be carried out 2–3 times to achieve a good quality

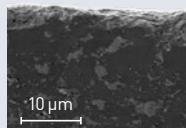
### LASERING

- + Lasers can machine diamond and binding material
- + Coarse-grained PCD types can be machined
- + Chip breakers are possible
- + Radius of cutting edges freely selectable
- + Highly complex geometries
- + Perfect cutting edges with minimal chipping
- + Up to 40% longer tool life

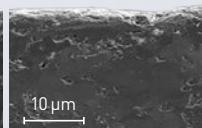
Ground cutting edge



Wire eroded



Disc eroded



Laser machined cutting edge



LASERTEC 20 PrecisionTool

# Laser finishing of diamond tools with up to 3.0 mm/min

The LASERTEC 20 PrecisionTool sets standards in the precision machining of diamond tools. Linear drives in all axes and the integrated swivelling rotary table with torque drives and a swivel range of  $-15^\circ$  to  $+130^\circ$  allow the laser processing of tools up to  $\varnothing 200 \times 344$  mm. Processing speeds of up to 3.0 mm/min are achieved, with straight profiles even up to **> 4.0 mm/min**. In addition to individual cutting edge processing with extremely sharp cutting edge preparations of less than 1 µm and defined rounding of 3, 6, 9, 12 and 15 µm as well as negative chamfers, round chamfers in PCD, PCBN, CVD and MCD can also be realised for reamers.

## HIGHLIGHTS

- + Highly dynamic 5-axis precision machine in gantry design with linear drives in all axes
- + Compact footprint of only 3,5 m<sup>2</sup>
- + Integrated swiveling rotary table (4<sup>th</sup>/5<sup>th</sup> axis in standard version) with torque technology,  $-15^\circ$ / $+130^\circ$
- + Precision cooling on all axes
- + Maximum workpiece size:  **$\varnothing 200 \times 344$  mm** (restrictions depending on the A-axis positioning)
- + Noncontact precision machining with no tool wear
- + LASERSOFT software package for laser machining of indexable cutting inserts, turning tools, shaft and HSK tools



LASERTEC 20 PrecisionTool – CUTTING EDGES/CHIP BREAKER/CHAMFERING CYLINDRICAL GRINDING

# Application examples – the highest flexibility compared to the competition

## COMBINATION TOOLS

HSK A/E 63 clamping



## MILLING TOOLS

HSK A/E 63 clamping



## MILLING TOOLS

Spannung HSK A/E 63



## THREAD CUTTERS



## REAMERS AND DRILLING TOOLS

Clamping alternative hydraulic chuck



## INDEXABLE CUTTING INSERTS

Multiple clamping



## AUTOMOTIVE



## CONSUMER GOODS



## AEROSPACE

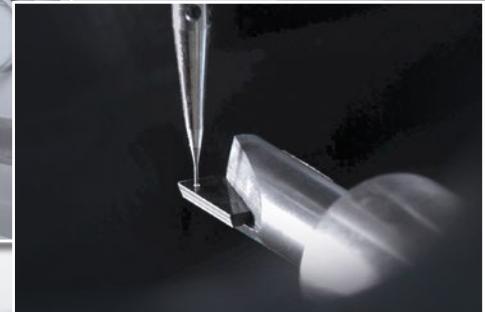
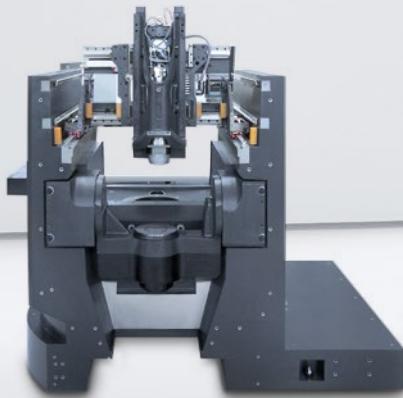


## WOOD WORKING



LASERTEC 20 PrecisionTool

## 5-axis machine version with integrated A-/C-axis



### LONG-TERM STABILITY

Thermo-symmetric and vibration-dampening mineral-cast base (approx. 3t), compact on a footprint of 3,5 m<sup>2</sup>.

### LINEAR TECHNOLOGY

Linear drive with >2g max. acceleration and precision cooling in X/Y/Z as standard/60 months warranty.

### 3D WORKPIECE MEASUREMENT

High-precision workpiece measuring and workpiece positioning in space using an infrared measuring probe.

## Clamping system options

HSK-63 TABLE (STANDARD)



HSK-80 OPTION

HSK-100 OPTION

HSK-63 MULTIPLE CLAMPING



HSK-63 monoBLOCK TOOLS



HYDRAULIC EXPANSION CHUCK  
HSK-63 SHAFT TOOLS



## LASERTEC 20 PrecisionTool

# Automation – fully integrated linear magazine PH 10 for maximum flexibility and autonomy



## HIGHLIGHTS AUTOMATION

- + Compact linear magazine with the best possible accessibility and workpiece automation from the top
- + Max. 54 HSK tools, each with a weight of up to 15 k
- + Dynamic part change <30 seconds
- + Version for shank tools and HSK tools available
- + Option: Pneumatic gripper change on the handling arm for HSK tools or shaft tools

With the integrated automation solution PH 10, up to 54 HSK tools can be loaded from the top into the work area of the LASERTEC 20.

## Automation variants

	D85/L140 variant	D85/L260 variant	D180/L140 variant	D180/L260 variant	D200/L260 variant	D85/L250 ø 6 – 10 mm variant mixed
Max. number of levels	6	4	6	4	4	1
Number of pockets per level	9	9	4	4	3	9
Max. tool diameter mm	85	85	180	180	200	85
Max. tool length [from HSK contact surface] mm	140	260	140	260	260	260
Number of spaces per level/total	9 / 54	9 / 36	4 / 24	4 / 32	4 / 16	3 / 12

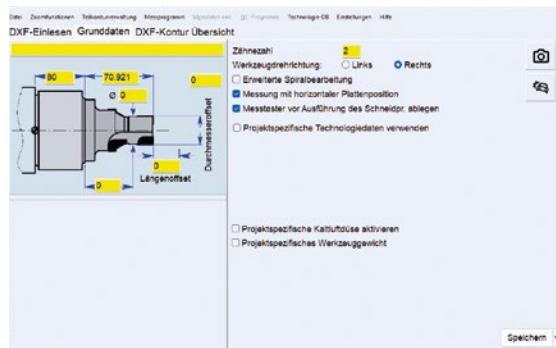
LASERSOFT PrecisionTool SOFTWARE FEATURES

# User-friendly established software features – the easiest entry from eroding to laser machining

## HIGHLIGHTS

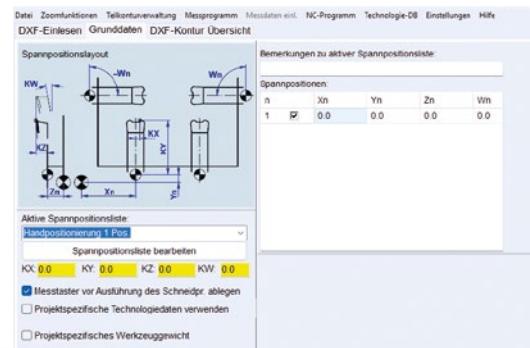
- + Use of industry standards as programming solutions allows the importation of existing EDM projects
- + Minimal training required when switching from EDM to lasers
- + Parameterized software for rotary or fixed tools
- + Import of tool geometry as DFX file
- + Automatic 3D measurement of the PCD surface
- + Automatic program generation
- + 3D simulation directly at the machine

## EndMill SOFTWARE



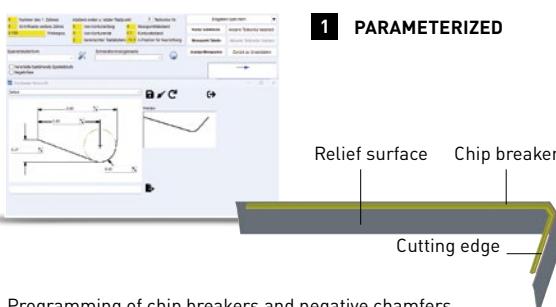
Programming of rotary tools

## TurningTools SOFTWARE

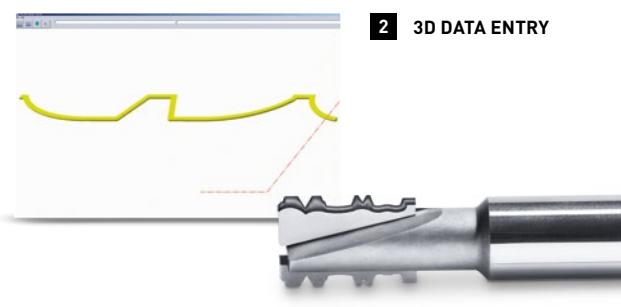


Programming of fixed tools

## ChipBreaker SOFTWARE



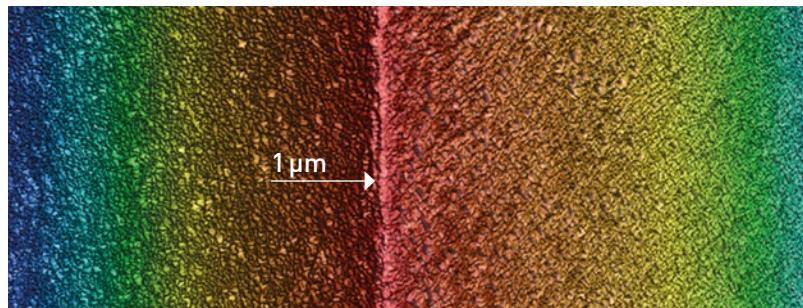
Programming of chip breakers and negative chamfers



## LASERTEC 20/50 PrecisionTool – CUTTING EDGES/CHIP BREAKERS

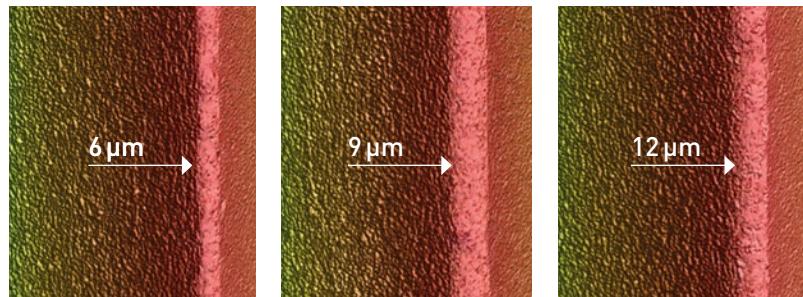
### EXTREMELY SHARP CUTTING EDGES

- + PCD cutting edges radius <1µm
- + Quality PCD relief angle Ra 0.05 µm



### SELECTABLE, DEFINED CUTTING EDGE CHAMFERS

- + The sharpness of the cutting edges has a direct influence on the workpiece surface quality and the tool service life
- + Defined cutting edge chamfers of 3, 6, 9, 12 or 15 µm
- + 40 % longer service life possible



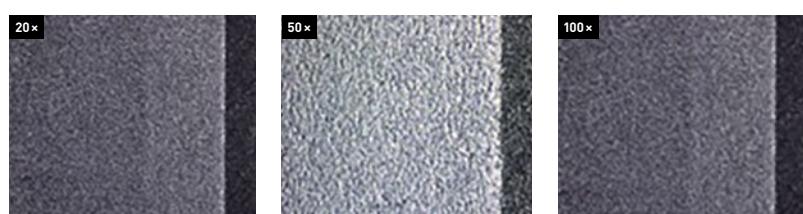
Microscopic image of the cutting edges

27

## CBN/CVD TECHNOLOGIES

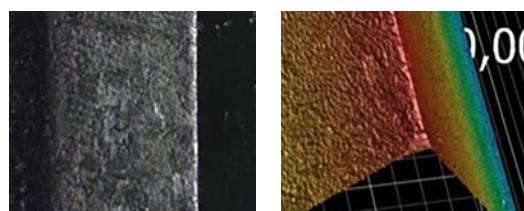
### CBN (E6 DBW 85, BZN 6000)

- + Relief angle surface Ra <0.2 µm
- + Cutting edge radius 6±2 µm



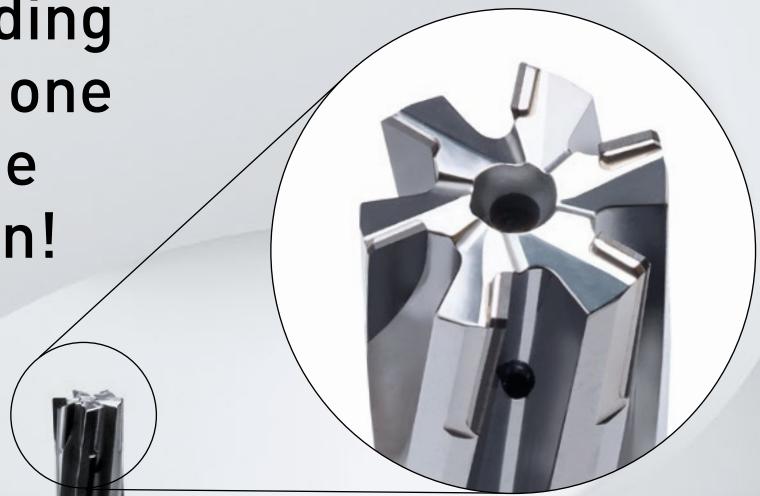
### CVD

- + Relief angle surface Ra <0.05 µm
- + Cutting edge radius 1±0.2 µm



DMG MORI PrecisionReamer

**Complete machining  
of PCD tools including  
round chamfer on one  
machine in just one  
clamping operation!**

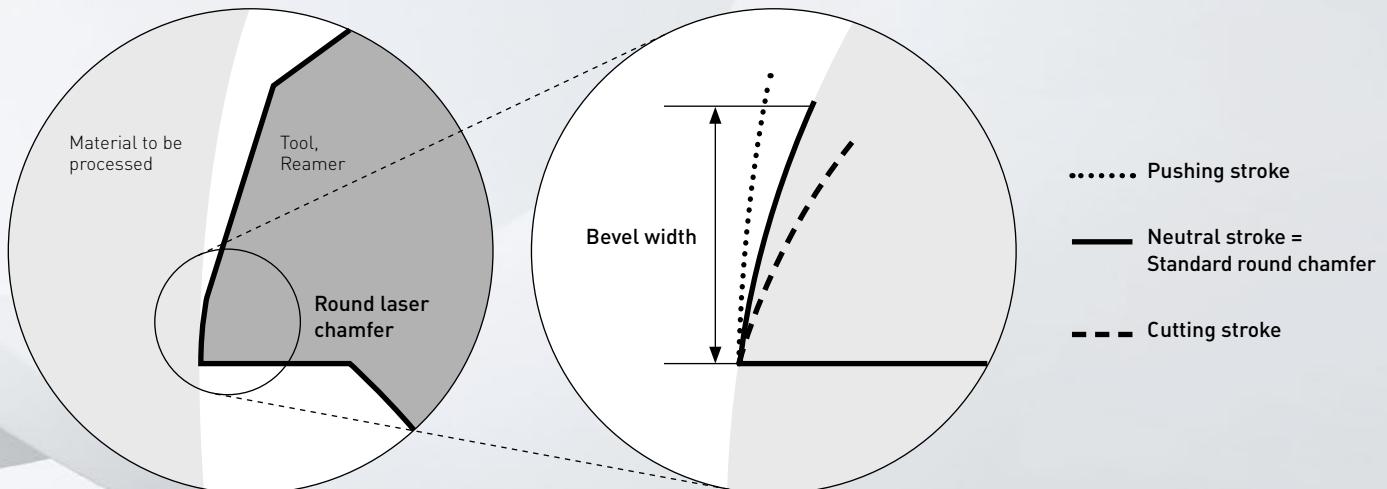


### HIGHLIGHTS

- + Application-specific configuration of the stroke (cutting/pressing)!
- + Process simplification and cycle time reduction independent of operator expertise!
- + Highest repeat accuracy and wear-free process!



## Application-specific individualisation of the stroke path through **DMG MORI PrecisionReamer technology**



## Creation of a round chamfer for PCD tools

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### CHALLENGES IN GRINDING

- Continuous process monitoring by personnel required
- Time-consuming process
- Inhomogeneous coolant temperature
- High tool wear of the grinding wheel
- High mechanical forces lead to deformation

### HIGHLIGHTS LASER PROCESSING

- + **DMG MORI PrecisionReamer Technology**
- + Finishing of the profile and the round chamfer on one machine in one clamping
- + NO tool wear
- + NO temperature drift
- + NO mechanical forces
- + Reduced part costs (less machining time, lower tool costs, smaller work area)
- + Clean working area (no oil)
- + NO costs for recycling



LASERTEC 50 PrecisionTool

## Quality and time advantages for tools up to ø 355 mm in woodworking and electromobility

With its significantly larger working room and high-speed mode technologies, the LASERTEC 50 PrecisionTool enables you to benefit from the advantages of lasered diamond tools also for tools up to **ø 355 and 420 mm** length. Application examples include new types of tools for electric motor stator housing or woodworking tools, which have the highest demands on cutting edge quality or lowest costs per unit.



*LASERTEC PrecisionTool technology is one of our most important success factors when manufacturing the highest quality PCD tools with the lowest cost per part.*

*Gerd Neher, Owner of Neher Diamant*



Special tool (PCD) for stator housings ø 355 mm and length 420 mm

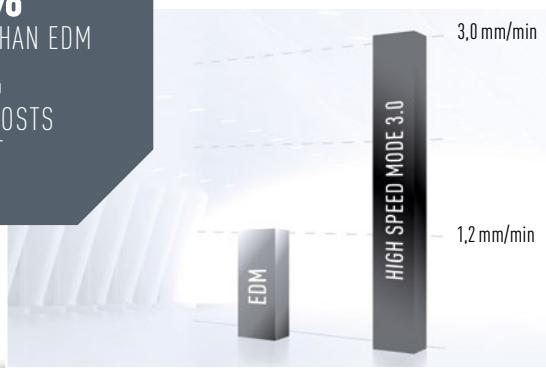
### HIGHLIGHTS

- + Linear drive with an acceleration of >1g
- + Highly dynamic torque motors in both rotary axes (B- and C-axis)
- + CCD camera and 3D-measuring probe for rapid setup
- + Solid, vibration-dampening machine bed with 3-point support
- + Industry-standard, user-friendly GTR software

- High Speed Mode 3.0:** 210% faster and 56% lower costs per unit in comparison to the EDM! Laser finishing of diamond tools with up to 3.0 mm/min with straight profiles up to 4 mm/min possible.
- Individual cutting edge machining –** Extremely sharp cutting edge preparation <1 µm; defined rounding of 3, 6, 9, 12, 15 µm; negative chamfers
- Lasered tool quality now up to** Ø 355 mm / l = 420 mm
- Flexible machining** of PKD, PCBN, CVD, MCD
- Easy automation** – with PH 50 or customised solutions

**210 %**  
FASTER THAN EDM  
**56 %**  
LOWER COSTS PER UNIT

### EDM VS. HIGH SPEED MODE 3.0



Deburring tool/PCD



Drill bit/PCD



Jointing cutter/PCD



Hogger/PCD



Up to 6 pcs. HSK63  
with max. Ø 355 × 370 mm and  
max. 30 kg workpiece weight



Up to 22 pcs. HSK63  
with max. Ø 90 × 440 mm and  
max. 30 kg workpiece weight

## PH 50 – automation for highest productivity

### HIGHLIGHTS

- + Most compact and cost-effective pallet automation of DMG MORI
- + Low space requirement with only 2,7 m<sup>2</sup> (1,6 × 1,7 m)
- + Pallet Master – for comfortable and simple control of the automation directly via the machine control
- + 3 NC axes for high flexibility and precision
- + Modular system with various tool pallet configurations for HSK-50, HSK-63, HSK-100, EROWA ITS, Schunk

LASERTEC 20 FOR CUTTING

## Separation and chamfering of PCD/CVD/CBN blanks

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1: Long-life, highly efficient nanosecond laser (QCW fibre)

2: Available as 3-, 3+1- or 5-axis configuration

3: Compact footprint with approx. 3.5 m<sup>2</sup>

### HIGHLIGHTS

- + 10 x faster than EDM
- + Reduction of work-intensive manual reworking during chamfering
- + Dynamic separation of PCD/CVD-D and CBN cutting segments from blanks
- + 3-, 3+1- or 5-axis machine with the latest linear/torque technology
- + Typical feed rate of 1.6 mm PCD ≈ 70 mm/min
- + Process with cutting gas (N<sub>2</sub>, O<sub>2</sub>)



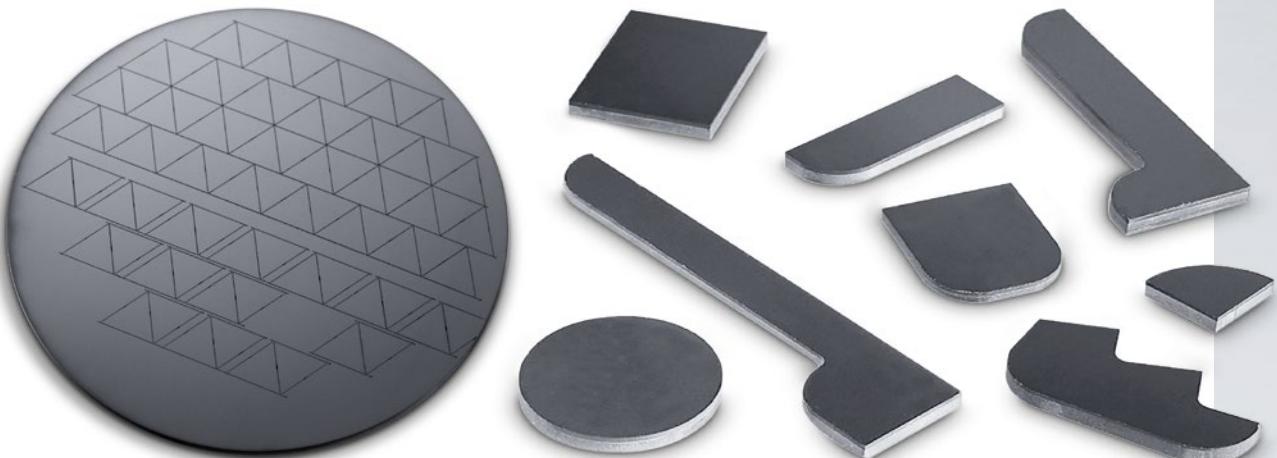
LASERTEC 20 FOR CUTTING, SEPARATING, CHAMFERING AND PRECUTTING

## Cutting speed comparison between wire eroding and the LASERTEC 20

COMPARISON TO  
WIRE ERODING:  
**10 – 15 ×  
MORE PRODUCTIVE  
WITH MINIMAL  
FOOTPRINT**

SEPARATING AND CHAMFERING

33

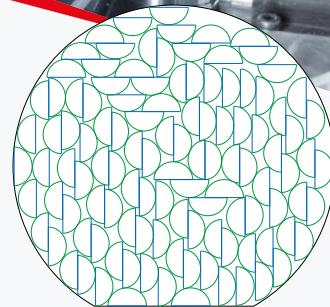


Material thickness	LASERTEC 20	Wire eroding
1.6 mm PCD	50 – 100 mm/min	4 – 8 mm/min
3.2 mm PCD	5 – 10 mm/min	1 – 3 mm/min

LASERTEC 20 FOR CUTTING, SEPARATING, CHAMFERING AND PRECUTTING

# Overview of the axes configuration

	3-axis machining	4-axis machining	5-axis machining
Clamping			
Machining			
+ Separating cutting segments from round blanks	+ Separating cutting segments from round blanks	+ Separating cutting segments from round blanks + A chamfer produced on the rear of a PCD cutting segment + Chamfered cutting segments. No manual reworking necessary.	+ Production of cutting segments from blanks + A chamfer produced on the rear of a PCD cutting segment (tungsten carbide) + Precast cutting edge and relief angle for times savings during the finishing process
Separation of the cutting plates	•	•	•
Machining of the reverse chamfer on tungsten carbide substrate	-	•	•
Cutting the geometry and preprocessing the relief angle	-	-	•



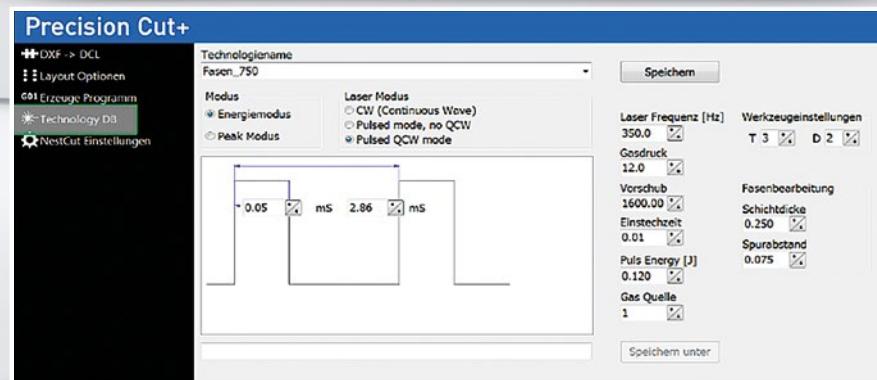
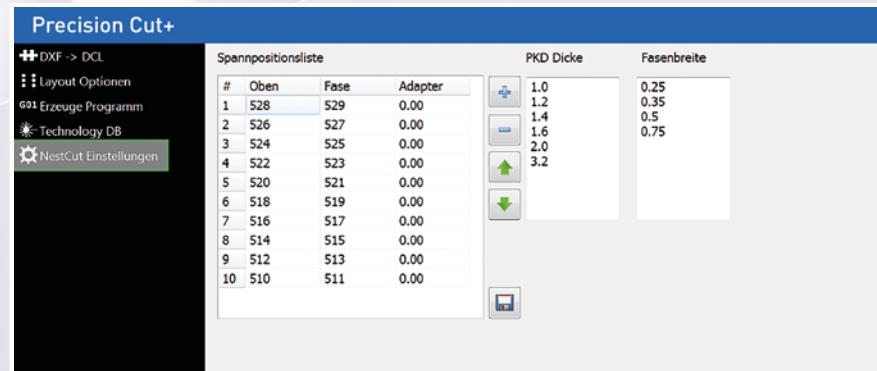
Clamping blanks with rotation function  
■ Chamfer ■ Cutting edge

## “Precision Cut” software – separation and chamfering of PCD blanks

35

**PRECISION CUT+**

- + Definition of the individual chamfer of the cutting segment specified for the width of the chamfer: 0.25/0.35/0.5/0.75 mm available
- + LASER: Frequency, feed, pulse energy and track width



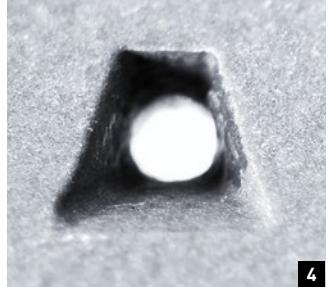
# LASERTEC PowerDrill

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## STATE-OF-THE-ART

Technology leadership in 5-axis precision drilling of cooling holes for aerospace and industrial gas turbines (IGT)





**1:** Laser welding of cover sheets

**2+3:** Combustor, combustion chambers, reducers

**4:** Shaped hole geometry with conical outlet funnel

**5:** Turbine blades

**6:** Turbine double vane



**5**

**6**

LASERTEC PowerDrill / PowerShape

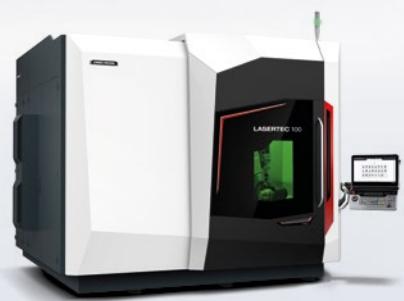
## Cooling air holes in turbine components for aerospace and power generation

With the models of the LASERTEC PowerDrill series, DMG MORI offers a fast and efficient solution for the production of cooling air holes in turbine components from the aerospace and industrial gas turbine (IGT) sectors. The machine version PowerShape enables the machining of shaped hole geometries for conical exit funnels.

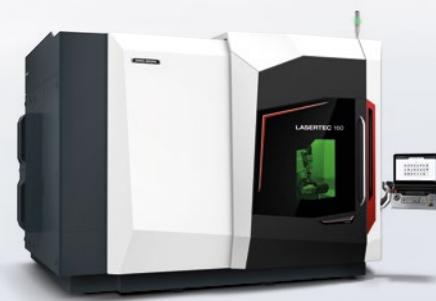
- + 5-axis laser precision drilling of turbine components from the aerospace and energy branch
- + Creation of cooling air holes by means of percussion drilling, trepanning or drilling on the fly
- + Precise 5-axis simultaneous machining with partially conical and cylindrical shapes in turbine vanes and blades, burners and combustion chambers
- + PowerDrill software tools enable easy programming and machining of complex components
- + PowerShape for the removal of e. g. conical exit funnels



**LASERTEC 50**  
PowerDrill

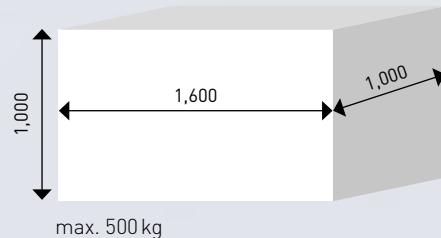
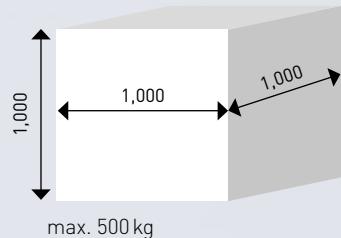
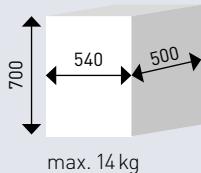


**LASERTEC 100**  
PowerDrill



**LASERTEC 160**  
PowerDrill

### TRAVERSE PATHS X/Y/Z

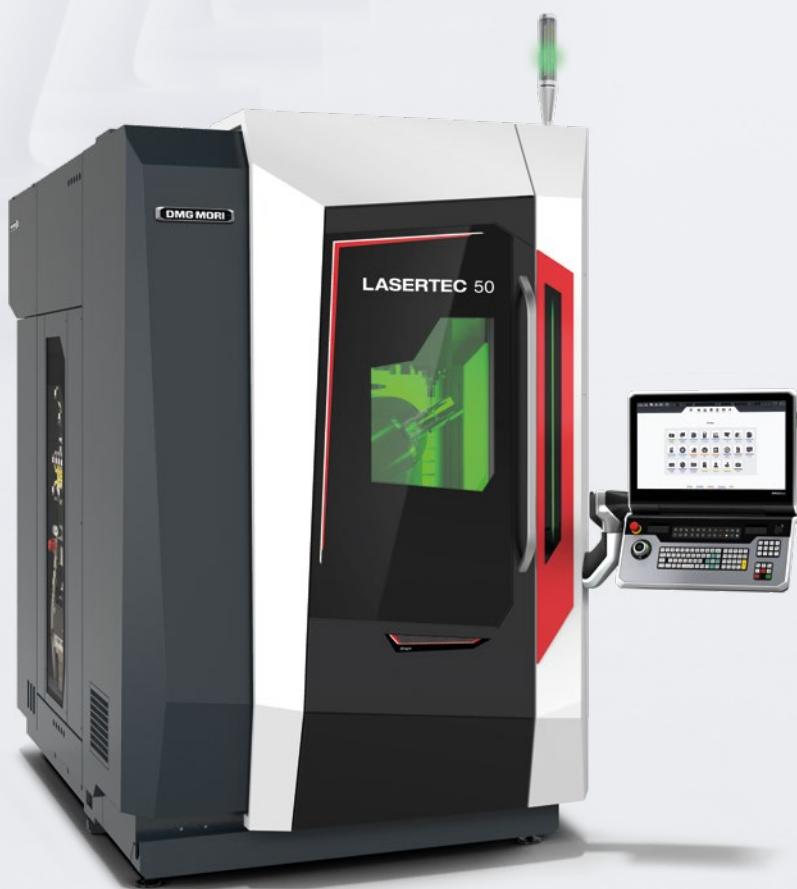


LASERTEC 50 PowerDrill

# Highly dynamic 5-axis laser precision machine with linear drives

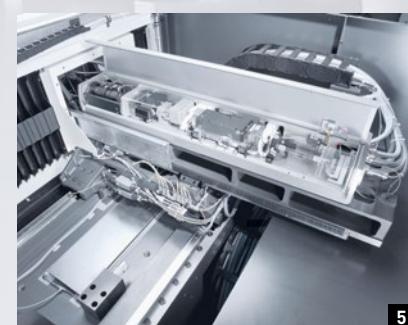
The LASERTEC 50 PowerDrill is a highly dynamic laser precision machine capable of handling challenging 5-axis machining with its built-in X- and Y-axis linear drives featuring  $>1g$  acceleration as well as water-cooled torque drives in the 4<sup>th</sup> and 5<sup>th</sup> axis. This high flexibility paired with numerous application-specific machine options and the available laser sources enables universal use of this compact machine in almost all LASERTEC technology fields.

The PowerDrill version of the LASERTEC 50 can be used for drilling or ablating of turbine blades and vanes and production of filter elements with high numbers of small holes.



## HIGHLIGHTS

- + Linear drive with an acceleration of  $>1g$
- + Highly dynamic torque motors in both rotary axes (B- and C-axis)
- + High positioning accuracy:  $A_{max}=8\mu m$  (according to ISO 230-2)
- + CCD camera and 3D-measuring probe for rapid setup
- + Solid, vibration-dampening machine bed with 3-point support
- + User-friendly CELOS X CNC control with SINUMERIK ONE as standard
- + Low space requirements with a  $4m^2$  footprint



**1:** Clearly organized work area with optimal workpiece accessibility   **2:** Laser nozzle with quick-change interface

**3:** Laser precision drilling of cooling air holes   **4:** Drilling on the fly with up to 500 holes per second

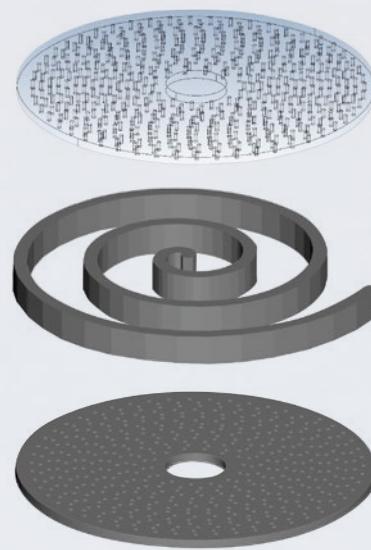
**5:** The linear motors and the laser are outside of the work area

"Drilling on the fly" (drilling with a rotating workpiece) enables the efficient production of various filter elements with thousands of micro-drillings up to 0.2 mm (depending on the thickness of the material)

#### LASERTEC 50

##### Filter discs

	400 mm	600 mm
Component diameter	400 mm	600 mm
Borehole diameter	0.2 mm	0.2 mm
Component thickness	2 mm	2 mm
Frequency	20 Hz	20 Hz
Number of boreholes	100,000	380,000
Machining time	1.5 h	4 h



LASERTEC 100/160 PowerDrill

# Strong performance for laser machining of turbine components up to XXL

The LASERTEC 100/160 PowerDrill sets new standards in 5-axis laser drilling. The new, modular travelling column concept impresses with its constant rigidity in the entire working area. Larger travels in X/Y/Z up to **1,600×1,000×1,000 mm** with a reduced footprint (12.7 m<sup>2</sup>/14.7 m<sup>2</sup>) offer maximum flexibility in the shop floor.

The modular axis concept, with a swivel axis in the tool and a rotary axis in the workpiece or alternatively with a swivel/rotary axis in the workpiece, offers the right kinematics for every application – especially for blade, vane and combustor processing. Depending on the application, the machines are available with 9 kW to **30 kW fiber lasers** and as PowerShape version for shaped hole processing.

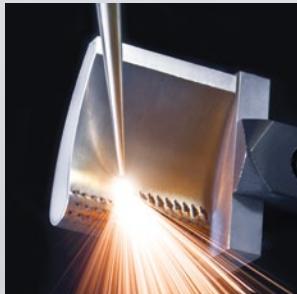
## HIGHLIGHTS

- + **New traveling column concept**  
Constant rigidity and increased positioning accuracy  
0.009 mm according to DIN ISO 10791-4
- + **Optimized cooling concept**  
Water-cooled motors, linear guides and ball screws
- + **Larger working area**  
X=1,000/1,600, Y=1,000, Z=1,000  
(LASERTEC 100/160 PowerDrill)
- + **Compact design**  
Space-saving fiber lasers (9 – 30 kW)  
for reduced floor space (12,7/14,7 m<sup>2</sup>)
- + **High dynamic**  
linear drives for X/Y 90 m/min; 7 m/s<sup>2</sup>
- + **Maximum flexibility**  
Different laser head kinematics and table variants
- + **State-of-the-art features,**  
variable collimation, breakthrough detection, capacitive distance sensors, optional tool changer, etc.





5-axis laser drilling with  
swiveling laser head and  
integrated NC rotary table



5-axis laser drilling of blades  
and vanes



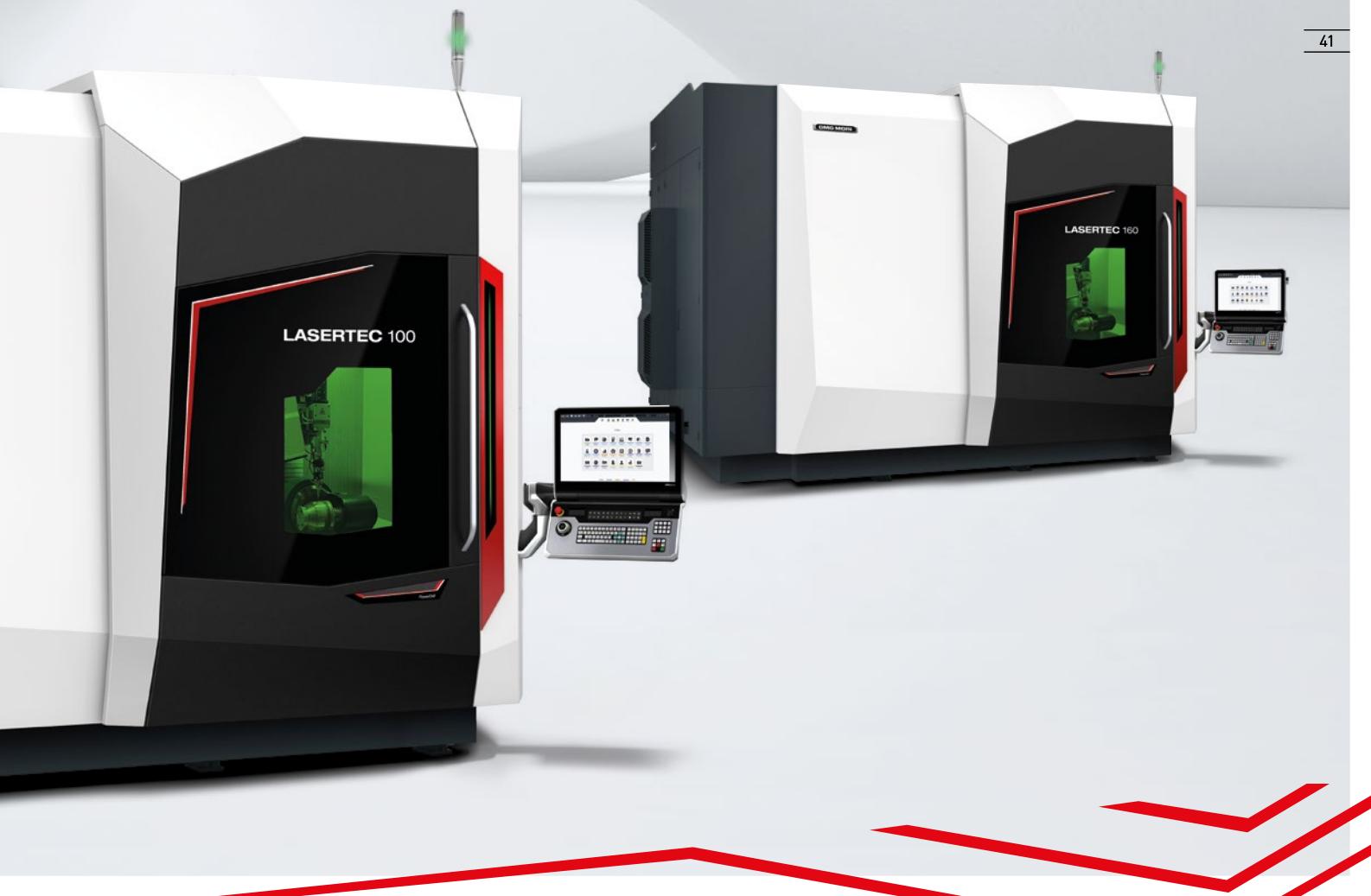
"Drilling in flight"  
from Cumbustoren



Automatic tool changer  
tool changer



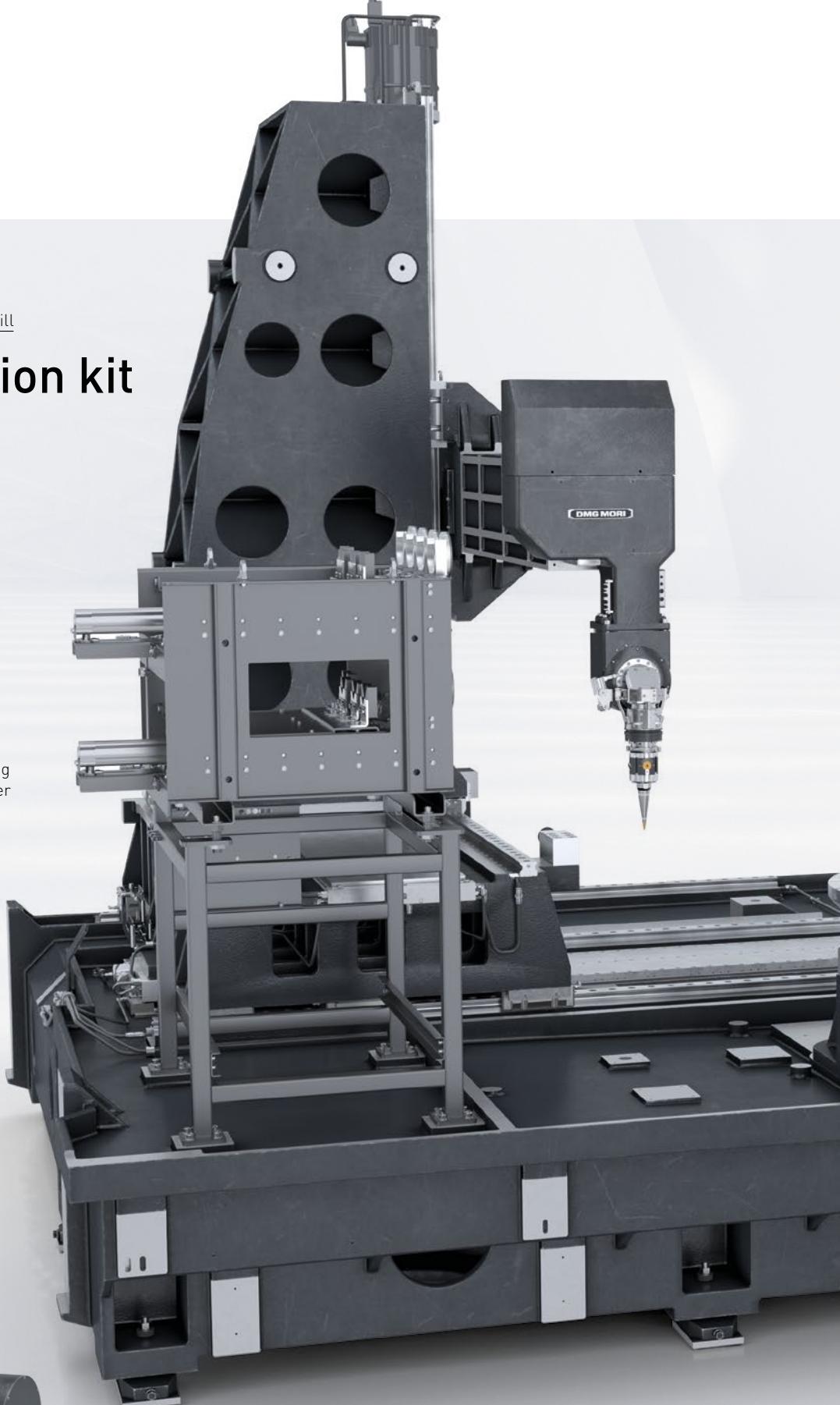
Collision protection  
in the laser head



LASERTEC 100 /160 PowerDrill

## Construction kit

**LASERTEC 100 PowerDrill**  
with C-axis (T-slots) swivelling  
head (B-axis) and tool changer

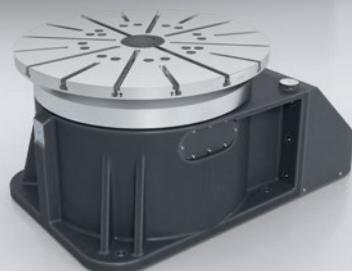


## Axis variants



**B-/C-axis**  
Max. ø 500 mm  
Max. 100 kg

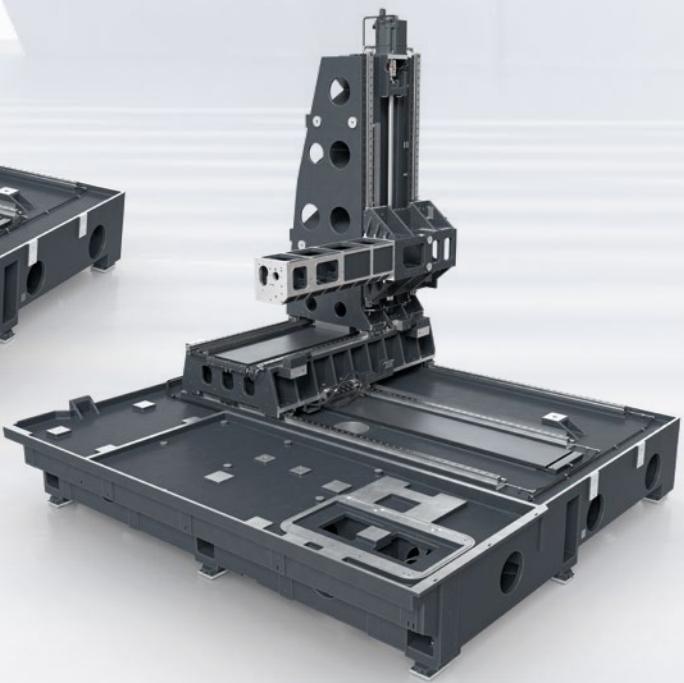
(Only in combination with  
straight beam path)



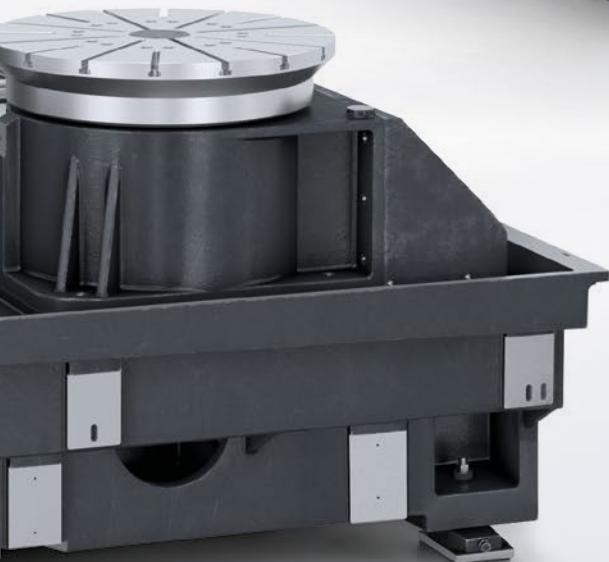
**C-axis with T-slots**  
Max. ø 1,100 mm  
Max. 500 kg

**LASERTEC 100 PowerDrill**

Traverse path X/Y/Z:  
1,000×1,000×1,000 mm

**LASERTEC 160 PowerDrill**

Traverse path X/Y/Z:  
1,600×1,000×1,000 mm



**C-axis with zero-point  
clamping system**  
Max. Ø 1,100 mm  
Max. 500 kg



**A-axis**  
Max. Ø 800 mm  
Max. 300 kg

LASERTEC PowerDrill MACHINE OPTIONS/SOFTWARE FEATURES

# Technology features for an optimized process and the highest flexibility

The powerful and user-friendly CNC control system SINUMERIK ONE with CELOS X ensures maximum ease of operation and process reliability when laser drilling turbine components. All available LASERSOFT PowerDrill packages combine high-tech performance with genuine customer benefits and ensure application-orientated, simple programming and operation.

## **INTEGRATED MEASURING PROBE**

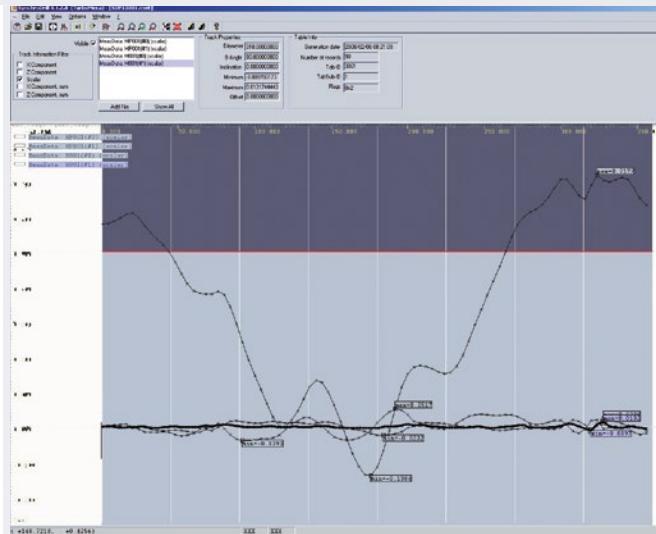
Integrated 3D measuring probe for automatic detection of the workpiece position in the machine space as well as the application of a "best fit" algorithm, which automatically adjust the cooling hole positions in relation to the CAD model.

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



## **LASERSOFT PartProbing LASERSOFT PartMapping**

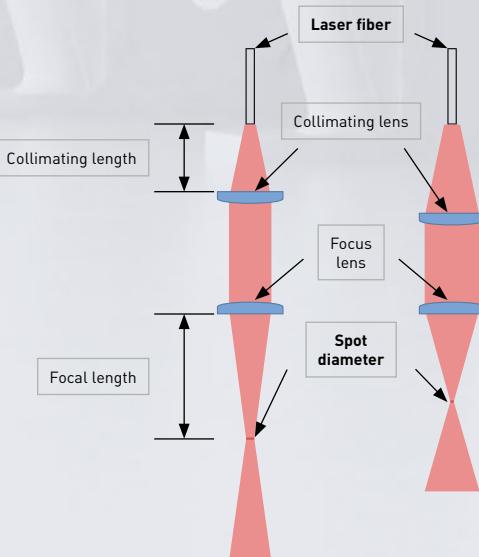
- + Measuring of rotation-symmetrical components via a capacitive sensor
- + Automatic compensation via axial and radial displacement
- + Mapping of components with protective ceramic coating



## VARIABLE COLLIMATION

Maximum flexibility thanks to automatically adjustable collimating lengths and thus adaption of the diameter of the laser spot:

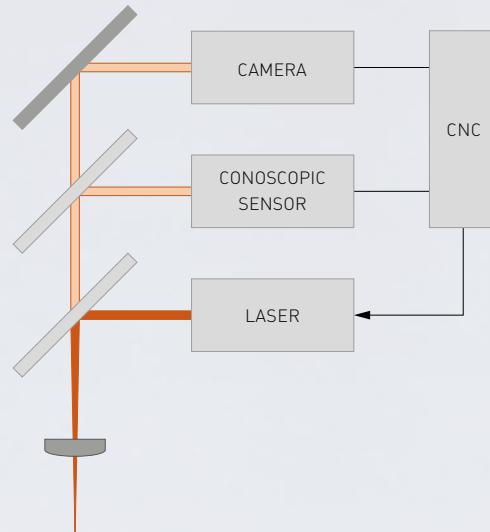
- + Collimation length  $F_{\text{col}}$  between 50 – 120 mm
- + Laser sources up to 4 kW average power
- + Reduction of manual interventions during the process
- + Example: Focal length F 200 mm enables the spot to be adjusted from 0.17 to 0.40 mm (at 100 µm fiber diameter)



## BREAKTHROUGH CONTROL

Fully integrated optical sensor for automatic through-hole detection when laser drilling turbine components during the machining process.

- + In-process control
- + Significantly reduced "back wall damage" and faster drilling at the same time
- + 20% faster machining through optimal number of pulses
- + Selectable number of cleaning pulses depending on material and application

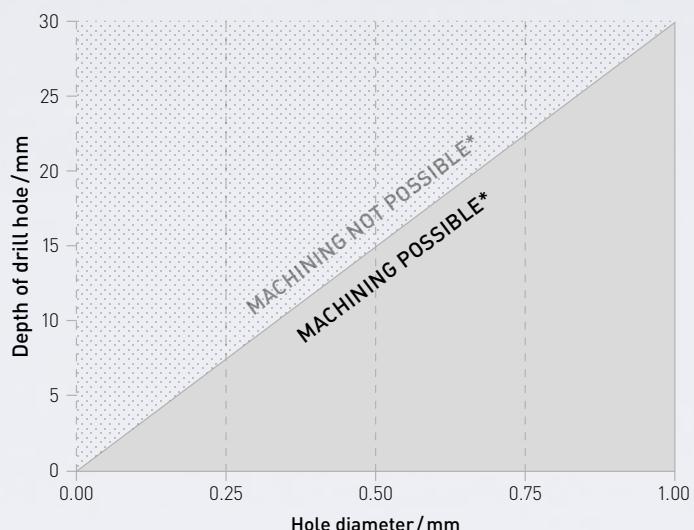


## HOLE DIMENSIONS

The dimensions that can be achieved for drill holes depend on:

- + Material
- + Material thickness
- + Laser source
- + Optics (collimation)

The use of variable collimation is recommended to enable the greatest flexibility in setting the spot diameter.



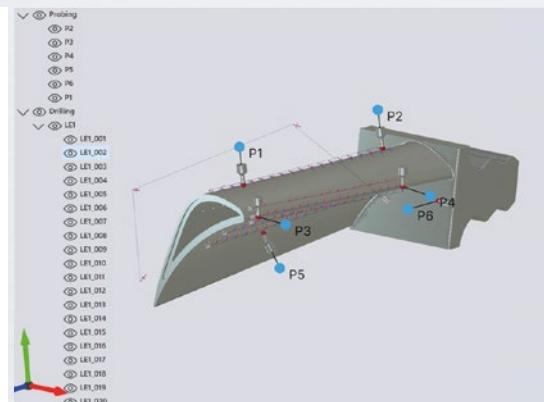
\*Application check required for individual cases

## SOFTWARE FEATURES

# PowerDrill – tailor-made software solutions for diverse applications

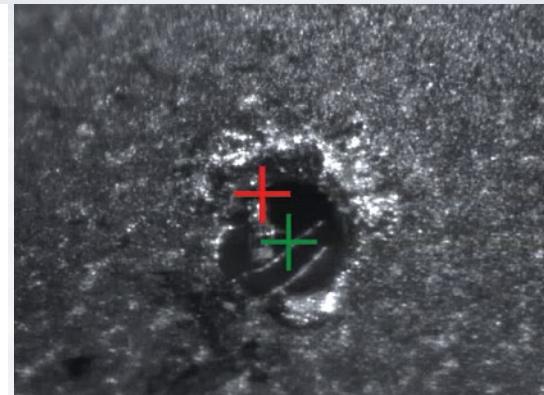
## LASERSOFT PowerDrill

- + 3D laser drilling programming system and special "Repair & Re-drilling" software
- + Automatic probing and positioning of the workpiece
- + Cycles for percussing and trepanning
- + 5-axis simultaneous machining of shaped drillings



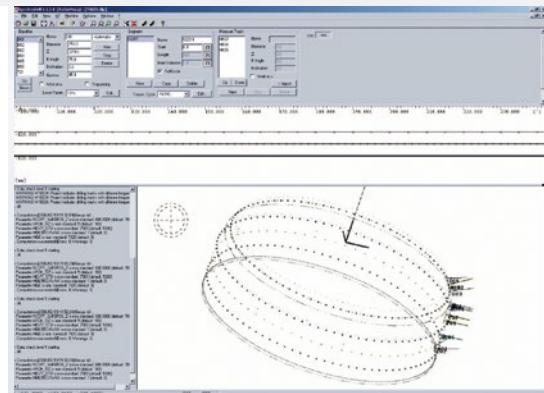
## AUTOMATIC HOLE DETECTION

- + Optical image data capture with camera through the beam path
- + Automatic positioning detection of drill holes and correction after comparison with the target data
- + Efficient solution for measuring, data correction and laser machining in one clamping
- + Parameters for image data processing can be set individually
- + Also available for PowerShape machines with offset camera



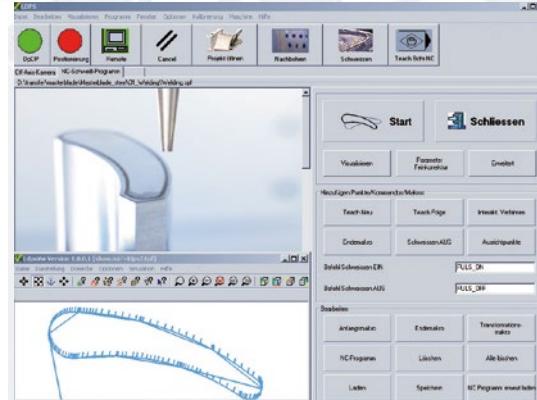
## LASERSOFT COMBUSTOR

- + **SynchroDrilling:** Laser drilling during component rotation, single- and multi-pulse operation possible and user-friendly parameterized programming system with 3D simulation
- + **PatternDrilling:** Laser drilling of segments and single rows possible
- + **Drilling on the fly:** Synchronization between continuous axis movement and laser pulses for minimizing positioning times



## 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



## ALTERNATIVE MACHINE VARIANT

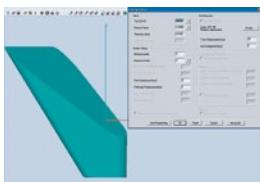
# PowerShape – laser ablation of shaped hole geometries and conical exit funnels

Machine version for laser ablation of turbine parts based on the basic PowerDrill machines. In addition to customising the laser source and the beam path, the specially developed in-house software enables the ablation volumes to be programmed from 3D CAD data.

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## HIGHLIGHTS

- + 2D scanner with 255 mm focal length and 60×60 mm scan field size
- + Z-shifter with ± 50 mm optical travel
- + 317 mm working distance for high accessibility
- + 200W nanosecond laser for high ablation rates in ceramic coatings and nickel-based alloys
- + Working head with measuring probe and camera for recognising the drilling positions
- + Networking with PowerDrill machine for transferring the drilling positions



DX – DIGITAL TRANSFORMATION

# CELOS X – The future-proof solution for manufacturing

CELOS X platform offers a holistic solution for the digital transformation. Combined with the ERGOline X control panel, manufacturing companies will increase their competitiveness worldwide.

CELOS X consists of the two components **CELOS Xchange**, the open, secure and scalable data platform, and **CELOS Xperience**, which gives access to all applications and systems within the CELOS X ecosystem. This enables a comprehensive and seamless digital experience for the user with the goal of easy machine operation, extended spindle hours while maximizing energy efficiency. CELOS X is therefore the centerpiece of the digital transformation (DX) and a significant contribution to DMG MORI's Machining Transformation (MX) strategy.



Further information on  
CELOS X can be found at:  
<https://celos.dmgmori.com>

## HIGHLIGHT APPS



### Operator Workbook

Optimal order processing in the office and throughout the shopfloor.



### Application Connector

Operate IT-systems directly on the control panel.



### Monitoring

Increase planning reliability and productivity through digital transparency.



### Tool Master

Manage tools directly on the machine.



### Energy Saving

Optimize the machine's carbon footprint by managing and reducing energy consumption.



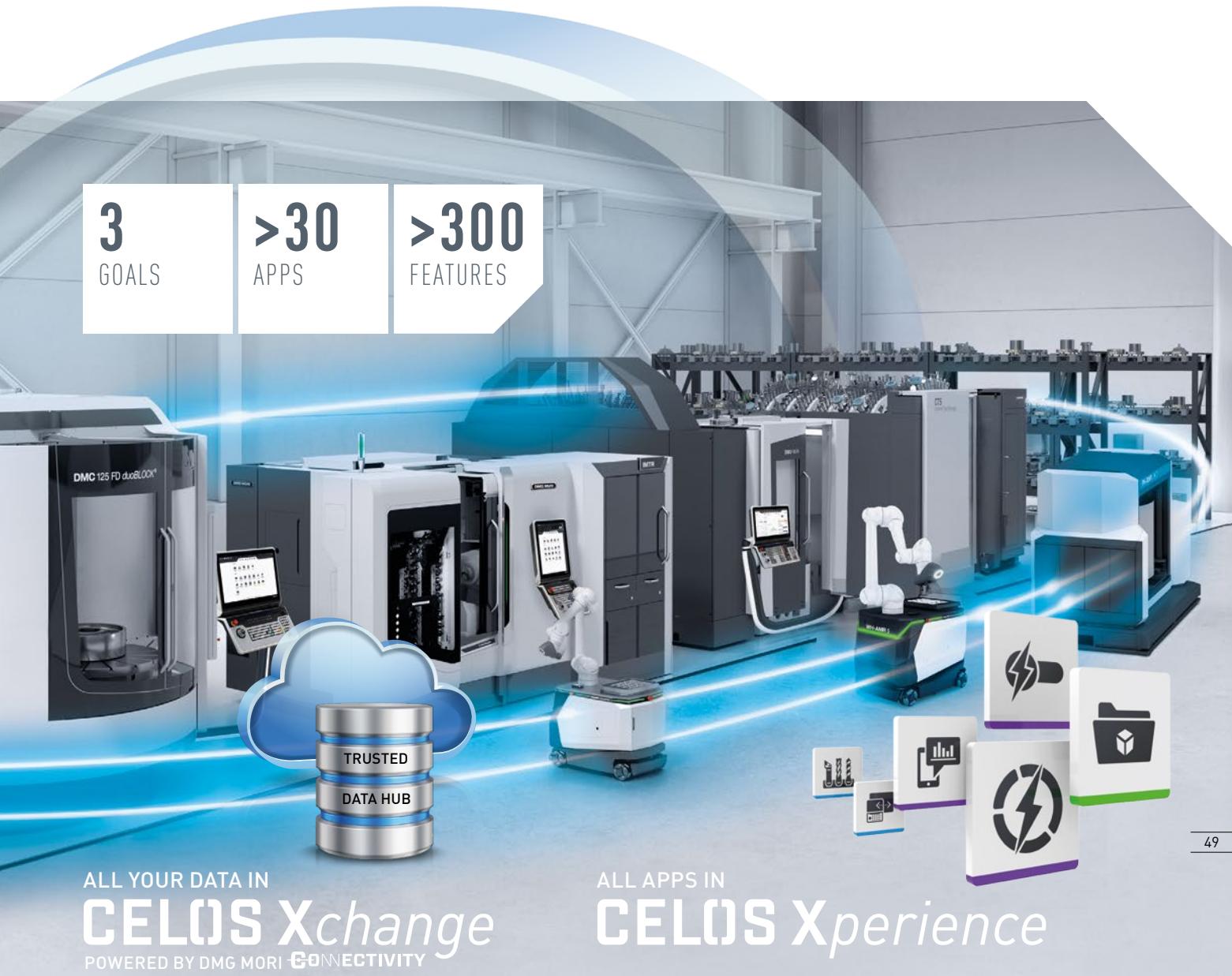
### Energy Monitoring

Track and monitor the energy consumption of the machine.

**3**  
GOALS

**>30**  
APPS

**>300**  
FEATURES



ALL YOUR DATA IN

## CELOS Xchange

POWERED BY DMG MORI CONNECTIVITY

ALL APPS IN

## CELOS Xperience

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### EASY OPERATION

In the manufacturing industry, the userfriendliness and ease of operation of machine tools plays a decisive role for the efficiency and productivity.

#### ADDED VALUE

- + Faster programming
- + Reduction of errors
- + Increased efficiency



### EXTENDED SPINDLE HOURS

In addition to easy operation, productivity is another crucial parameter, which requires a holistic view across all production processes.

#### ADDED VALUE

- + Optimization of set-up processes & capacity planning
- + Shorter processing times and order changes
- + Increased machine availability



### ENERGY EFFICIENCY

The energy efficiency of machine tools is of utmost importance to DMG MORI and CELOS X makes a valuable contribution to this, adding direct value to the customer.

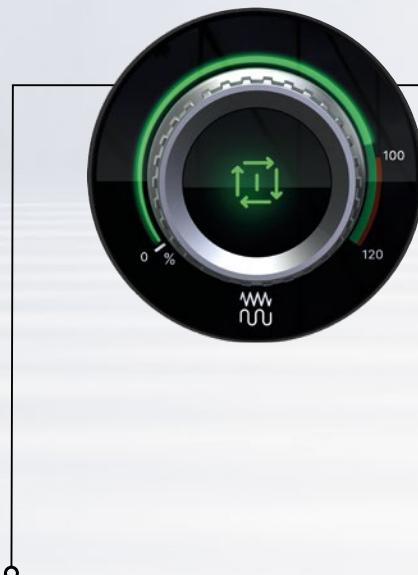
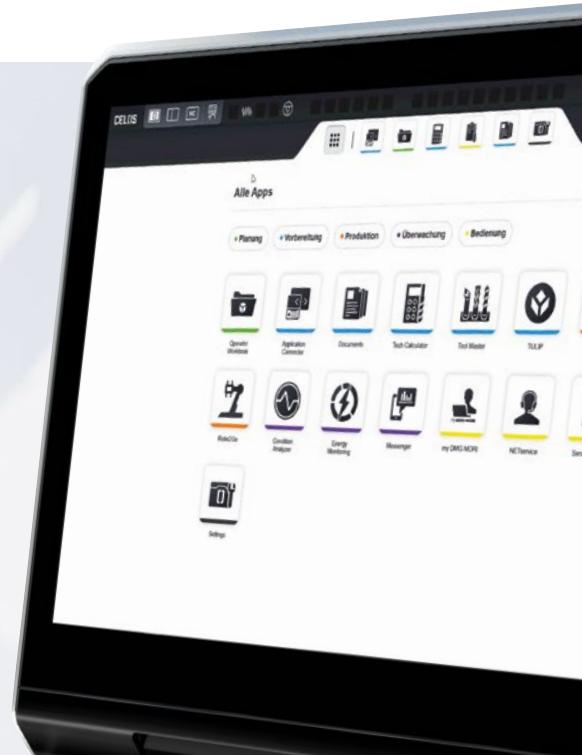
#### ADDED VALUE

- + Real-time monitoring of energy consumption
- + Automated adaptation of energy requirements to machining processes
- + Optimized & demand-driven air and cooling lubricant supply

CONTROL TECHNOLOGY

## ERGOline X – Innovative control panel for easy operation

The ERGOline X control panel provides the machine operator with an even more intuitive user experience, whereby the ergonomics and the functionality in particular have been optimized. The ERGOline X control panel gives the user access to CELOS Xperience and the native NC controller.



**24" ERGOline X Panel**  
with Sinumerik ONE and CELOS X

### SMARTride

- + Integrated panic function to instantly reduce the feed rate/rapid traverse to 0
- + Integrated haptic feedback to recognize 0 % & 100 %
- + Feed rate, rapid traverse & NC-start combined in one control element

### CONNECTIVITY

by **DMG MORI**

- + Standard connectivity thanks to integrated IoTconnector
- + MDE (Machine Data Recording) possible
- + Automatic output of at least 17 standardized production status signals
- + Openness to third-party products
- + Communication in accordance with standard protocols:



## SMARTkey

- + Compact credit card format
- + Personalized access rights depending on user level
- + Independently customizable SMARTkeys

## SIEMENS SINUMERIK ONE

- + Maximum speed and shorter non-productive times
- + Familiar SIEMENS control interface
- + 3D Shopfloor Programming exclusively for DMG MORI
- + Feature-based programming in Store Mill/Turn directly at the machine
- + Compatibility with SIEMENS 840D Solutionline and 828D

## HIGHLIGHT APPS



### Operator Workbook

CELOS APP for optimal order processing in the office and on the shop floor.



### Application Connector

Display and operate customer IT systems directly on the panel of the machine.



### OP Workbench

Simple design and process optimization of NC programs.

## MACHINE SIGNALS VIA OPC-UA, MTCONNECT AND MQTT

### MACHINE DATA

1. Serial number of the machine
2. Operating hours
3. Machine on hours

### MACHINE STATUS

4. Status display
5. Number of alarms
6. Messages, alarms, warnings
7. Control mode
8. Machine version status

### PRODUCTIVITY

9. Workpiece counter, current
10. Workpiece counter, total
11. Target quantity
12. Current program runtime

### PROCESS DATA

13. Laser on/off
14. Fast speed correction
15. Infeed correction
16. Active tool
17. Name of the current NC program

### ADDITIONAL MACHINE SIGNALS

Machine-specific signals, e.g. Laser power, process gas, scan mode, scan speed, etc.

LASERTEC SHAPE

# Technical Data

**LASERTEC 50 Shape**

<b>Travel paths / rotation range / swivel range</b>		
X-/Y-/Z-axis	mm	540/500/700
A-axis	Degree	-
B-axis	Degree	-100°/+160°
C-axis	Degree	360°
<b>Feed</b>		
Rapid traverse X/Y/Z	m/min	30/30/30
<b>Work table/workpieces</b>		
Work table dimensions (3-axis)	mm	650×390
Max. workpiece dimensions* (L×W)	mm	500×500
Max. workpiece weight	kg	120
Work table dimensions (5-axis)	mm	ø 200
Max. workpiece dimensions* (ø×H)	mm	ø 300×350
Max. workpiece weight (option)	kg	14/30
<b>Laser source standard</b>		
Laserquelle	type	Femtosecond laser
Leistung	Watt	20
<b>Laserquelle Option</b>		
Laser source	type	Nanosekundenlaser
Power	Watt	100
<b>Laser source option</b>		
Width × depth × height (basic machine)	mm	1,543×2,512×2,762
Machine weight	kg	5,000
Operating voltage		400V/50 Hz/3 phase/N/PE
Power rating	kVA	65
I n max.	A	90
Compressed air supply min. (required))	bar	6
Basic machine compressed air consumption / max. peripherals	m³/h	18

\*component specific

# Technical Data

		LASERTEC 20 PrecisionTool	LASERTEC 50 PrecisionTool
<b>Travel paths / rotation range / swivel range</b>			
X- / Y- / Z-axis	mm	200 / 460 / 280	540 / 500 / 700
A-axis	Degree	-10° / + 130°	-
B-axis	Degree	-	-90° / +150°
C-axis	Degree	360°	360°
<b>Feed</b>			
Rapid traverse X/Y/Z	m/min	40 / 40 / 40	60 / 60 / 20
<b>Work table / workpieces</b>			
Work table dimensions (5-axis)	mm	ø 200	ø 260
Max. workpiece dimensions* (ø x H)	mm	ø 200 x 344	ø 355 x 420 (with HSK63)
Max. workpiece weight (option)	kg	15	30
<b>Laser source standard</b>			
Laser source	type	Nanosecond laser	Nanosecond laser
Power	Watt	100	100
<b>Laser source option</b>			
Laser source	type	-	Femtosecond laser
Power	Watt	-	20
<b>Machine data</b>			
Width x depth x height (basic machine)	mm	2,038 x 2,729 x 2,427	1,543 x 2,512 x 2,762
Machine weight	kg	4,000	5,000
Operating voltage		400V / 50 Hz / 3 phase / N / PE	400V / 50 Hz / 3 phase / N / PE
Power rating	kVA	47.2	65
I n max.	A	68.2	90
Compressed air supply min. (required)	bar	6	6
Basic machine compressed air consumption / max.peripherals	m³/h	18	18

\*component specific

LASERTEC PowerDrill

# Technical Data

**LASERTEC 50 PowerDrill<sup>2</sup>**

Machine kinematics		B-/C-table
<b>Travel paths / rotation range / swivel range</b>		
X/Y/Z-axis	mm	540/500/700
A-axis	Degree	-100°/+160°
B-axis (option)	Degree	-
C-axis	Degree	360°
<b>Feed</b>		
Rapid traverse X/Y/Z	m/min	60/60/30
<b>Work table / workpieces</b>		
Work table dimensions (5-axis)	mm	Ø200
Max. workpiece diameter <sup>1</sup>	mm	Ø300
Max. workpiece height <sup>1</sup>	mm	350
Max. workpiece weight (option)	kg	14
<b>Laser source standard</b>		
Working head	type	Fixed
Laser source	type	Nanosecond laser
Power (peak)	Watt	9,000
<b>Laser source option</b>		
Working head	type	Fixed
Laser source	type	Nanosecond laser
Power (peak)	Watt	12,000–30,000
<b>Machine data</b>		
Width × depth × height (basic machine)	mm	1,510×2,973×2,839
Machine weight	kg	5,500
Operating voltage		400V/50 Hz/3 phase/N/PE
Power rating	kVA	50–62.5
I <sub>n</sub> max.	A	72–90.4
Compressed air supply min. (required)	bar	6
Basic machine compressed air consumption/ max. peripherals	m <sup>3</sup> /h	18

<sup>1</sup>component specific   <sup>2</sup>Version PowerShape with 200W Ytterbium fiber laser   <sup>3</sup>Version PowerShape available as of Q1/2023

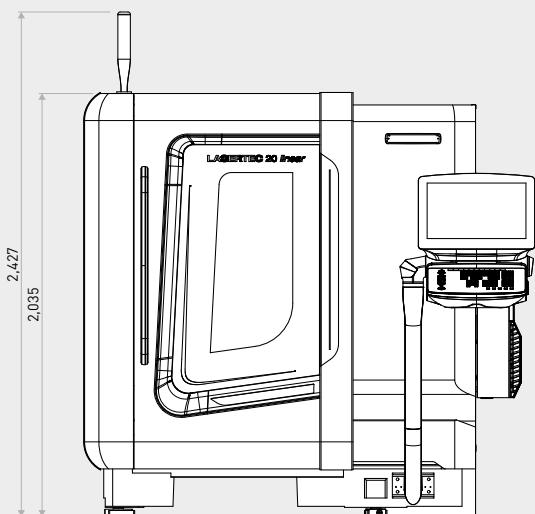
LASERTEC 100 PowerDrill <sup>3</sup>		LASERTEC 160 PowerDrill <sup>3</sup>	
Fixed head, B- / C-table	B-head, C-table	B-head, C-table	B-head, A-table
1,000 / 1,000 / 1,000		1,600 / 1,000 / 1,000	
-		-	360°
-95° / +160°	-150° / +150°	-150° / +150°	
360°	360°	360°	-
90 / 90 / 60		90 / 90 / 60	
360	430 / 650	430 / 650	
500	1,000 / 1,150	1,150	800
740	1,000	1,000	1,600
100	500	500	300
Fixed	Swivelling head [B-axis]	Swivelling head [B-axis]	
Nanosecond laser		Nanosecond laser	
9,000		9,000	
Fixed	Swivelling head [B-axis]	Swivelling head [B-axis]	
Nanosecond laser		Nanosecond laser	
12,000 – 30,000		12,000 – 30,000	
4,005 × 3,471 × 3,607		4,605 × 3,471 × 3,607	
15,000		17,000	
400 V / 50 Hz / 3 phase / N / PE		400 V / 50 Hz / 3 phase / N / PE	
61		61	
88		88	
6		6	
18		18	

LASERTEC SERIES

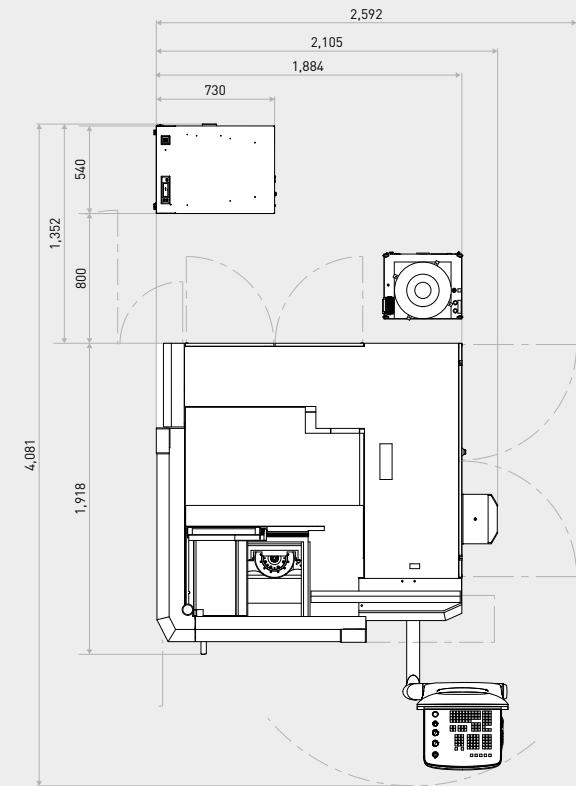
# Floor plans

**LASERTEC 20**

Front view

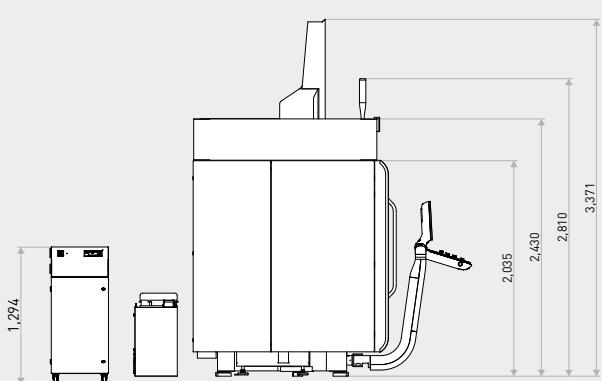


Top view

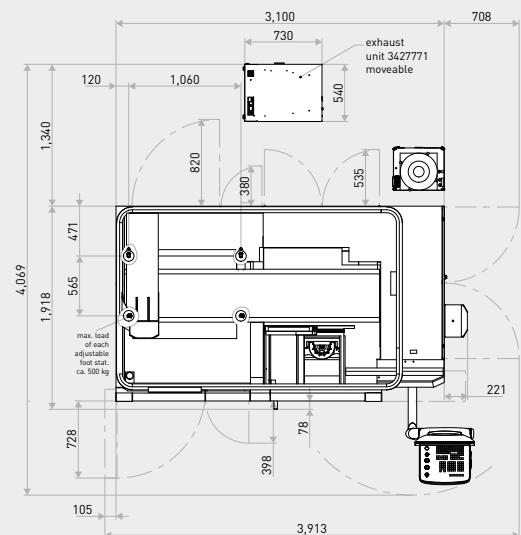


**LASERTEC 20 with PH 10**

Front view

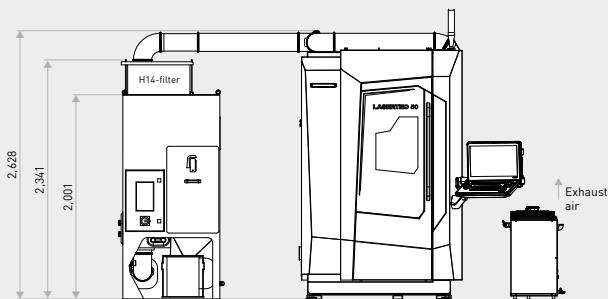


Top view

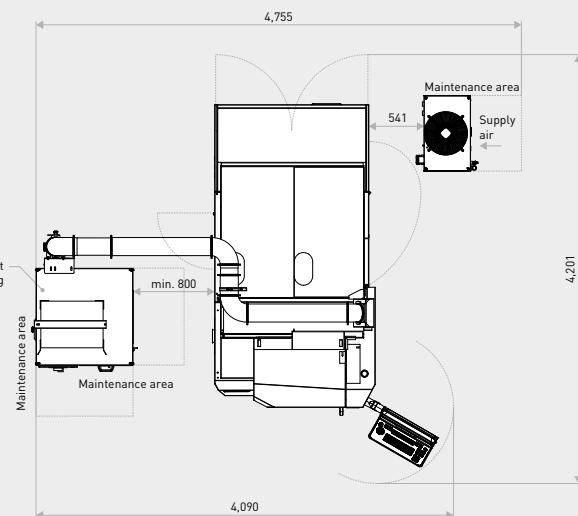


## LASERTEC 50

Front view



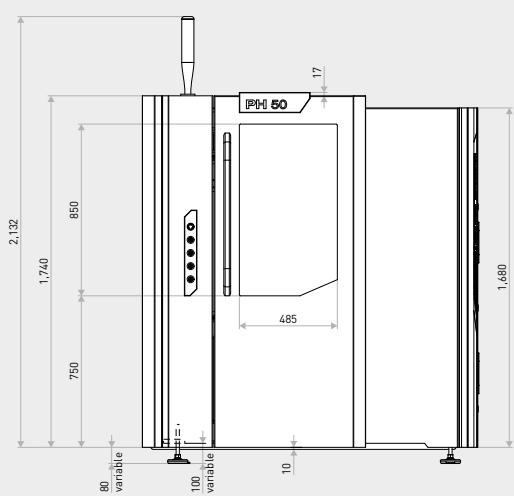
Top view



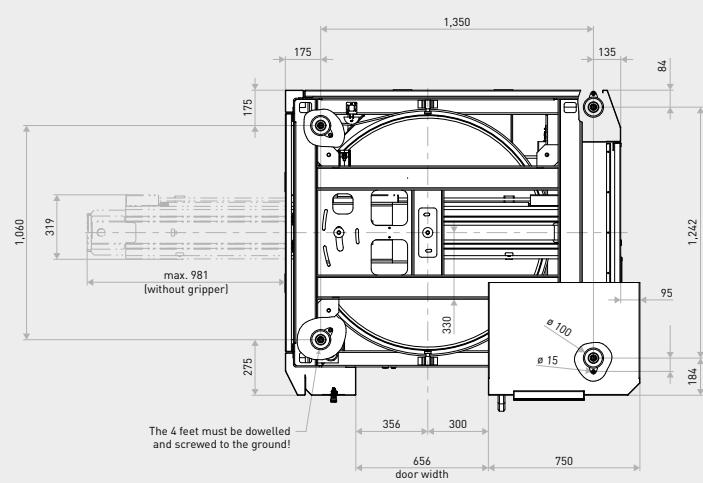
Version with femtosecond laser, dimensions of the extraction differ depending on the selected machine configuration.

## Pallet automation PH 50

Front view



Top view

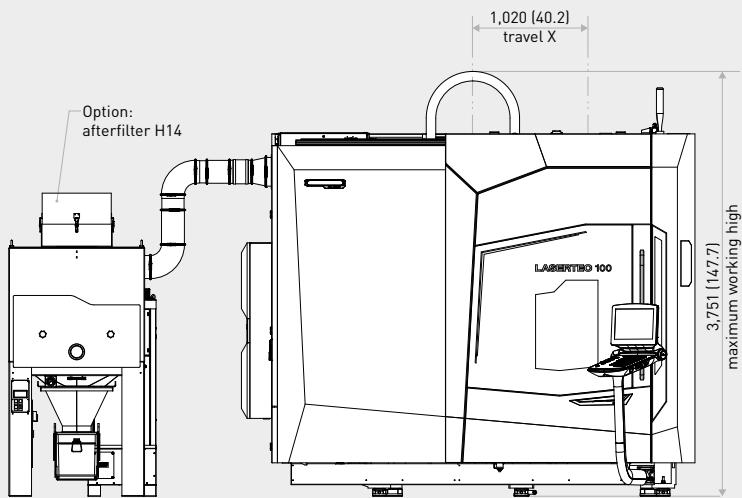


LASERTEC SERIES

# Floor plans

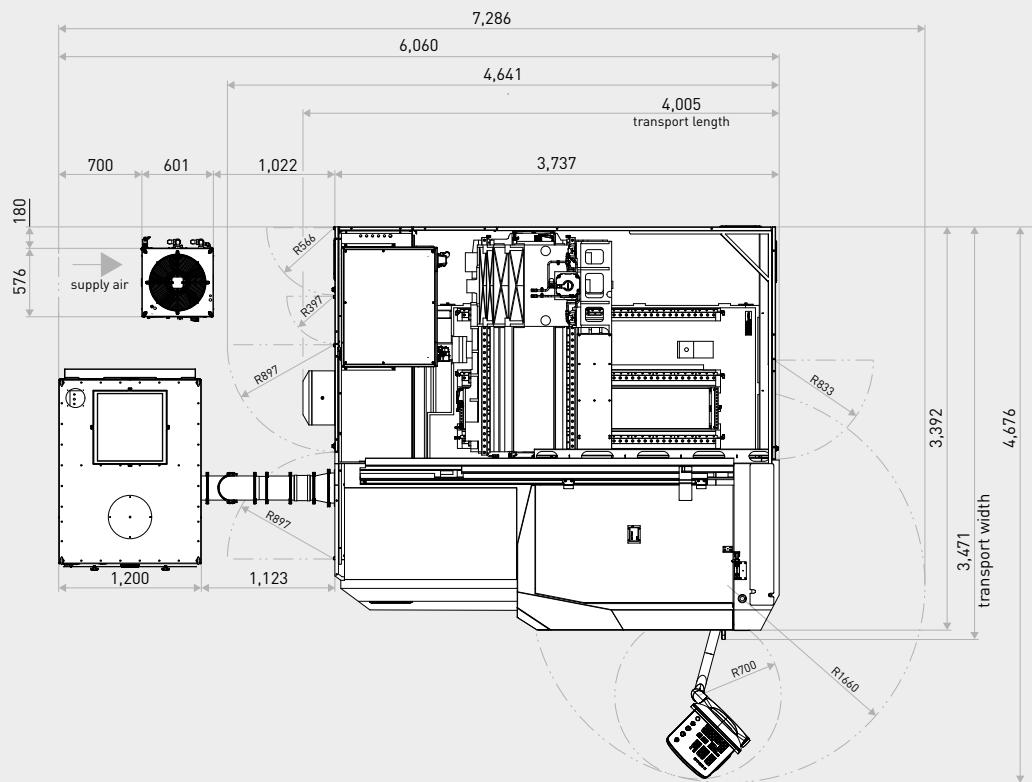
LASERTEC 100/160 PowerDrill

Front view



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Top view



PROGRESS THROUGH INNOVATION

# Turnkey provider with impressive technology expertise

In addition to the actual machine production, DMG MORI Ultrasonic Lasertec also offers you the user expertise you require in all three technology areas and supports customers with feasibility studies, process optimization as well as turnkey developments. In addition, LASERTEC Technology Seminars are hosted for customers and interested parties at regular intervals. Here you can take a look at live machining processes on our demonstration machines in a modern showroom on the Pfronten site.



LASERTEC Showroom in Pfronten

## LASERTEC EXCELLENCE

- + > 30 years of experience in laser precision machining
- + > 1.000 LASERTEC machines installed (worldwide)
- + Application and technology expertise: Training, customer support, complete turnkey solutions
- + Regular LASERTEC Technology Seminars/Webinars



Production in Pfronten

## ULTRASONIC EXCELLENCE

- + > 40 years of experience in the machining of hard/brittle and hard to machine advanced materials like ceramic, glass, corundum, carbide and composites
- + ULTRASONIC technology for reduced proces forces by up to 50 % for maximum productivity, surface quality, precision and longer tool life
- + Strong, competent team of application engineers for feasibility studies, process development, complete turn-key-solutions
- + Regular ULTRASONIC Technology Seminars/Webinars



ULTRASONIC in Stipshauen

# YOUR ONLINE SERVICE MANAGER

## my DMG MORI

The customer portal for service optimization

### MORE SERVICE

Fast support and live status of your service requests

### MORE KNOWLEDGE

All relevant documents can be called up digitally

### MORE AVAILABILITY

The direct line to a service expert with guaranteed prioritized processing, registration in <3 minutes

**Every customer benefits – at no extra charge!**



YOUR HISTORY



YOUR MACHINES

# myDMG MORI

CUSTOMER PORTAL



YOUR DOCUMENTS



YOUR SERVICE REQUESTS

All countries in which myDMG MORI is available can be found at: [myDMGMORI.com](http://myDMGMORI.com)



You too can benefit!  
Register now for free:  
[myDMGMORI.com](http://myDMGMORI.com)

## CUSTOMER FIRST – OUR SERVICE PROMISE!

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%\*.

\*All information and price advantages for Customer First are available at: [customer-first.dmgmori.com](http://customer-first.dmgmori.com)



### Spindle service at best prices.

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

**Export Control:** Machines and products from DMG MORI may be subject to export restrictions. Therefore, prior export control authorization from competent authorities may be required. To prevent the illegal diversion of the equipment to individuals or nations that threaten international security, every DMG MORI machine is equipped with an RMS function (Relocation Machine Security). The RMS automatically deactivates the machine when the machine is moved or disassembled. Such deactivation does not take place during regular operation or maintenance. If the equipment is so-disabled, it can only be re-activated by DMG MORI or some authorized representatives. Reactivation can be ordered via DMG MORI Service. If the machine is deactivated due to a substantial repair activity, this service is free of charge. DMG MORI may refuse to re-activate the machine if it determines that doing so would be an unauthorized export of technology or otherwise violate applicable export restrictions. DMG MORI shall have no obligation to re-activate such a machine and shall have no liability as a result thereof.