

Directed Energy Deposition & 5-axis Machine

LASERTEC 3000 *DED hybrid*

## LASERTEC 3000 *DED hybrid*



NEW

CLIMATE-NEUTRA PRODUCTION  
OF OUR MACHINES



## Highlights

Applications and Parts

Machine and Technology

Machine specifications

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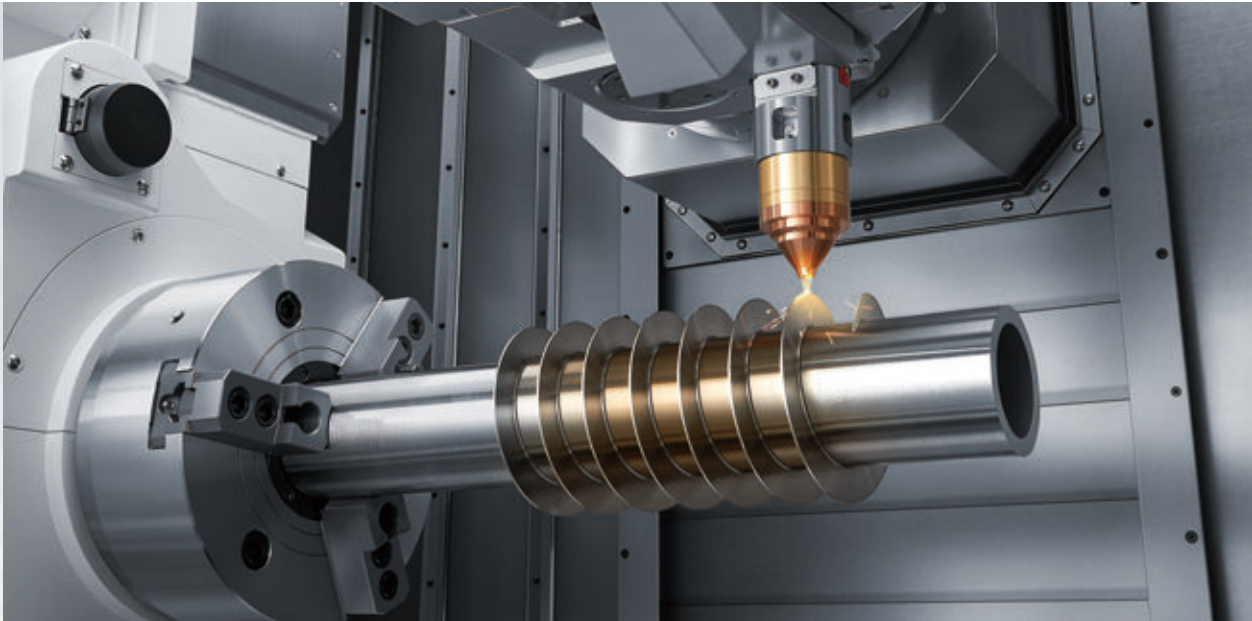
# Hybrid machine for compact 5-axis directed energy deposition and 5-axis integrated mill-turn machining

The Additive Manufacturing (AM) unit mounted on the integrated mill turn center enables both (simultaneous 5-axis) directed energy deposition and simultaneous 5-axis machining for processing of complex workpieces in one chucking.

Furthermore, processes for repair and coating can be integrated efficiently as well.

LASERTEC 3000 *DED hybrid* offers completely new applications for customers.





### Highlight

- + Maximum turning length: 1,519 mm (59.8 in.)
- + Turning / milling spindle "compactMASTER" as short as 350 mm (13.8 in.)
- + AM Assistant (Option)
  - Your reliable assistant to support additive processes
  - Monitors melt pool size and temperature and controls laser output by feedbacking the monitored values for a stable build
- <Melt Pool Monitoring>
  - Continuously monitors melt pool conditions
- <Working distance monitoring>
  - Measures and monitors the distance between nozzle and melt pool
- <Automatic Powder Calibration>
  - Automatically measures the powder flow rate
  - Different materials can be mixed by powder feeder with 2 hoppers (Option)
- + Compact AM Head
  - Maximum main laser output: 3 kW (4.0 HP)
- + 2 types of AM nozzles: Coaxial nozzle and MultiJet nozzle
  - Coaxial nozzle for high-efficiency vertical deposition
  - MultiJet nozzle for deposition during AM head rotation
- + Compact machine floor space:
  - 6,876 mm [270.7 in.] <width> × 4,510 mm [177.6 in.] <depth>
- + Laser safety window and laser guard sensors for safe operation



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# Supporting a wide range of markets with various applications including molding, repairing and coating

## 3D printing of finished products and prototypes



Prototypes, low-volume production parts, low-yield-rate parts, single-molded parts, complex-shaped and light parts and deposition to existing components

## Repair of turbines, tools and dies & molds



Repair of worn or broken parts

## Corrosion-resistant and wear-resistant coating



Partial or whole coating (Corrosion and wear prevention)

## Deposition of different types of metals



Deposition on different types of metal, Functionally graded material

## Operating principle – Laser deposition

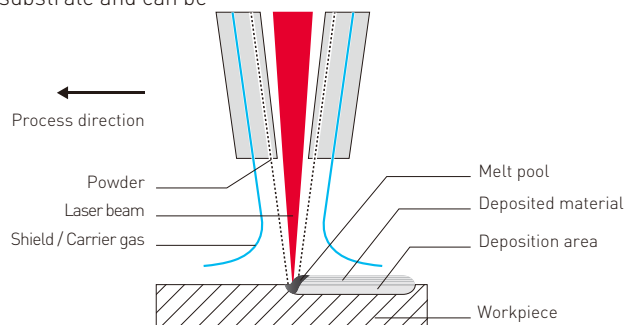
Metal powder is applied in layers to a base material and fused together by laser without any pores or cracks. A coaxial shield gas prevents oxidation during the build-up process.

A high-strength, fusion-bonded joint forms with the substrate and can be machined, once cooled.

### Materials:

SUS316L / Inconel718 / Inconel625 /  
Cobalt alloy / Cemented carbide (Nickel based) /  
High-speed steel (Molybdenum) / Bronze

• Please consult our sales representative for information on other materials.



## Oil / Gas



### Target workpieces

- + Valves and control valves
- + Drill bits
- + Wellhead equipment components
- + Impellers

### DED hybrid Advantage

- + Complete repair of die casting
- + Major replacement of casting parts
- + Deposition of high value-added material



## Industry / Energy / Science / Plant engineering



### Target workpieces

- + Valves and control valves
- + Die rolls
- + Screw shafts
- + Blades

### DED hybrid Advantage

- + Pre-machining, repair and finishing in one setup
- + Coating on finished workpieces
- + Possible to use different materials

## Aerospace



### Target workpieces

- + Landing gears
- + Rocket components
- + Blades

### DED hybrid Advantage

- + Pre-machining, repair and finishing in one setup
- + Creation of protruding objects



## Engineering



### Target workpieces

- + Expensive materials

### DED hybrid Advantage

- + Prototyping with new materials
- + High flexibility for complex shapes
- + Small-lot production and manufacturing of spare parts

## Tool / Die & Mold / Automotive

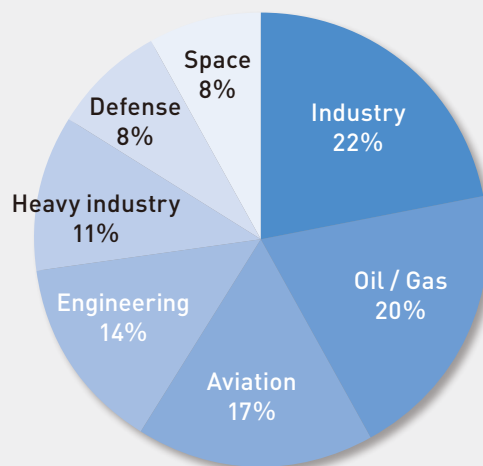


### Target workpieces

- + Die cast molds (new production and repair)
- + Deposition on existing workpieces

### DED hybrid Advantage

- + Full repair of die casting
- + Major replacement of casting parts
- + High hardening without heat treatment



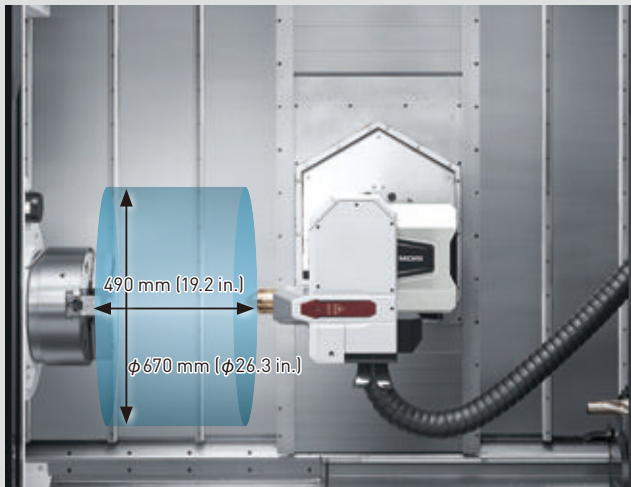


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# Flexible 5-axis additive manufacturing and 5-axis machining

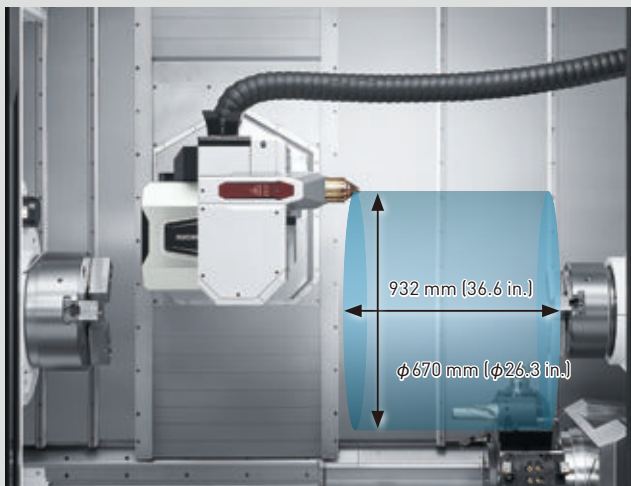
X- / Y- / Z-axis stroke of the AM head is 675 mm [26.5 in.], 300 mm [11.8 in.], and 1,381 mm [54.3 in.] respectively. Metal deposition is not only possible on the left spindle (B-axis = 0°) but also on the right spindle (B-axis = 180°). And by transferring a workpiece between both spindles, both end faces can be deposited, offering a large variety of metal depositions.

## Maximum deposition workpiece size

**B-axis = 0°**

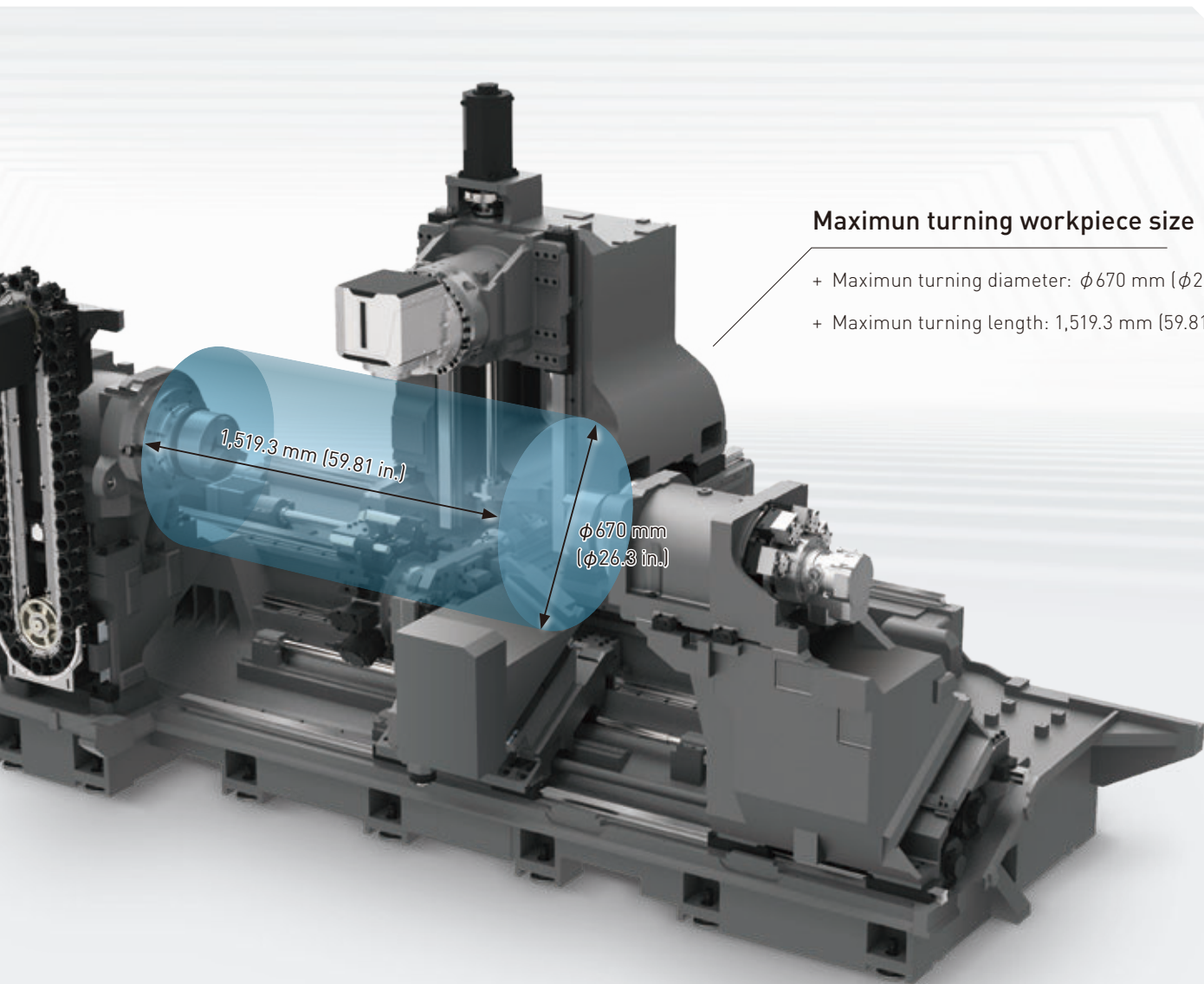
### Left spindle-side

- + Maximum deposition workpiece diameter:  $\phi 670$  mm ( $\phi 26.3$  in.)
- + Maximum deposition workpiece length: 490 mm (19.2 in.)

**B-axis = 180°**

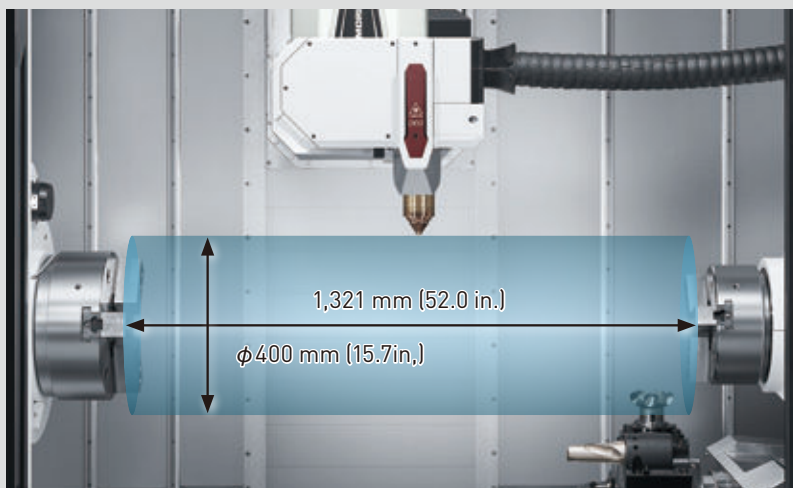
### Right spindle-side

- + Maximum deposition workpiece diameter:  $\phi 670$  mm ( $\phi 26.3$  in.)
- + Maximum deposition workpiece length: 932 mm (36.6 in.)



### Maximun turning workpiece size

- + Maximun turning diameter:  $\phi 670$  mm ( $\phi 26.3$  in.)
- + Maximun turning length: 1,519.3 mm (59.81 in.)



B-axis =  $90^\circ$

### Between Left and Right spindle

- + Maximun deposition workpiece diameter:  $\phi 400$  mm (15.7 in.)
- + Maximun deposition workpiece length: 1,321 mm (52.0 in.)

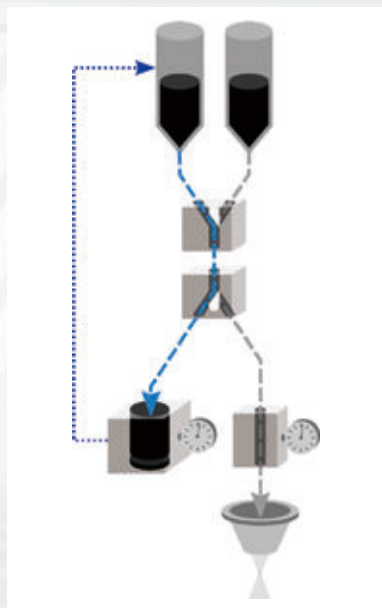
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# "AM Assistant" supports you during additive manufacturing (Option)

Achieves stable metal deposition by adjusting the laser power to the temperature and the size measured at the melt pool, and monitoring the distance between nozzle and workpiece, as well as the powder flow rate.

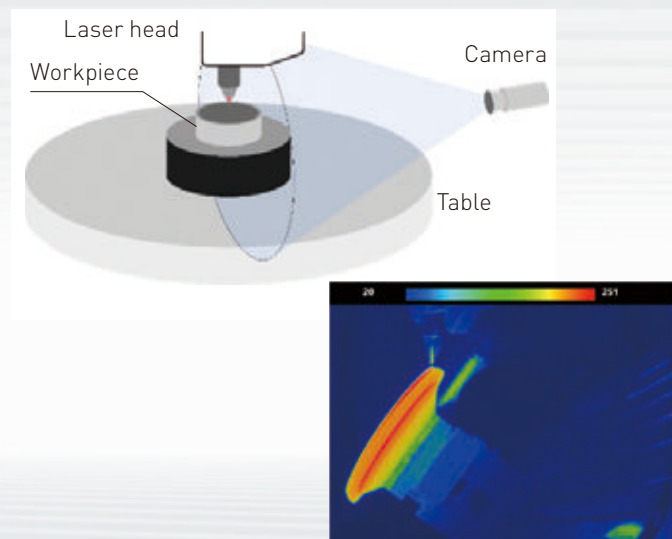
## Automatic powder calibration

Measurement of powder flow rate and specification of the target volume and the tolerated limit to be supplied



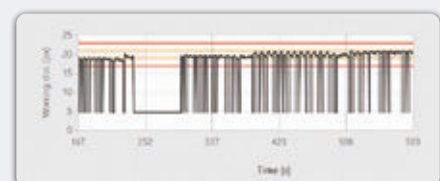
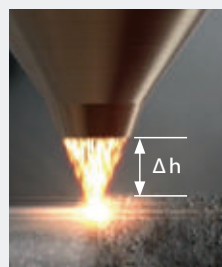
## Monitoring of the deposited workpiece

Measurement of temperature of deposited workpiece and stop of deposition if temperature becomes out of range



## Working distance monitoring

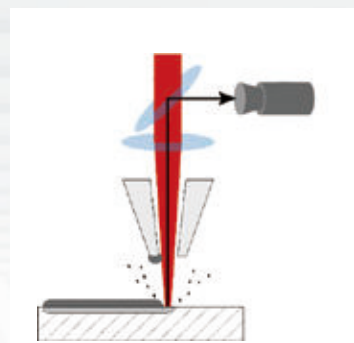
Monitors the distance between nozzle and workpiece, and stops when outside of the defined range





## Melt pool monitoring

Monitors the melt pool continuously and detects adhesion of material to the nozzle



## AM Analyzer V2

Monitors the processing, analyzes and controls to secure safety



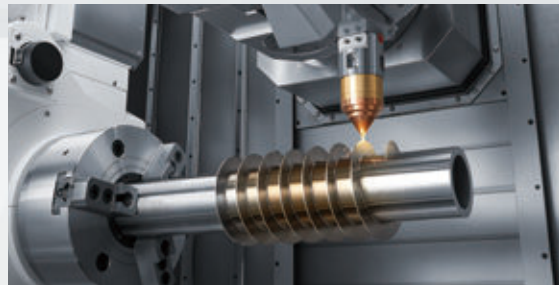
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# Optimal equipment for a safe working environment

LASERTEC 3000 *DED hybrid* machines are designed with the highest priority on operator usability. This focus can be seen throughout the whole machine design.

## AM head

Attached into the Turning / Milling spindle  
2 types of AM nozzles (coaxial nozzle and  
multijet nozzle) are available.



## Laser safety window

Protection against laser light leakage  
from the machine



## Sensor for laser light detection

Detects leakage of laser light

### Laser class

Class 1 is achieved by closing the machine door during machining. To maintain class 1 during machining, the safety sensors and door lock switch must detect that door, ATC shutter and maintenance covers are closed, and check the conveyor position.

## Fume collector

Collects metal fume generated during  
deposition and effectively removes dust  
by mist collector.



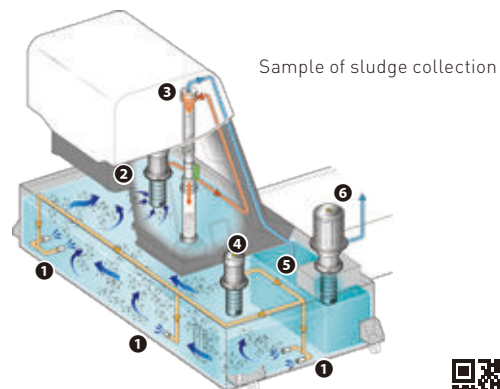
## Zero sludge coolant tank equipped as standard

Multiple coolant nozzles are arranged to stir coolant and efficiently collect fine casting sludge by a high-accuracy cyclone filter.

- + Dramatically reduces the need for cleaning the coolant tank
- + Prevents clogging of pipes / coolant nozzles and pump breakage
- + Expands coolant life

- ❶ Coolant nozzle
- ❷ Inlet filter pump
- ❸ Cyclone filter
- ❹ Stirring nozzle coolant pump
- ❺ Clean coolant tank (from cyclone filter)
- ❻ Through-spindle coolant pump

- Not compatible with oil-based coolant.



[Click here to watch a video of zero sludge coolant tank.](#)



## Powder feeder with 2 hoppers

Mixed deposition of different types of metals is available

## Powder switch and calibration

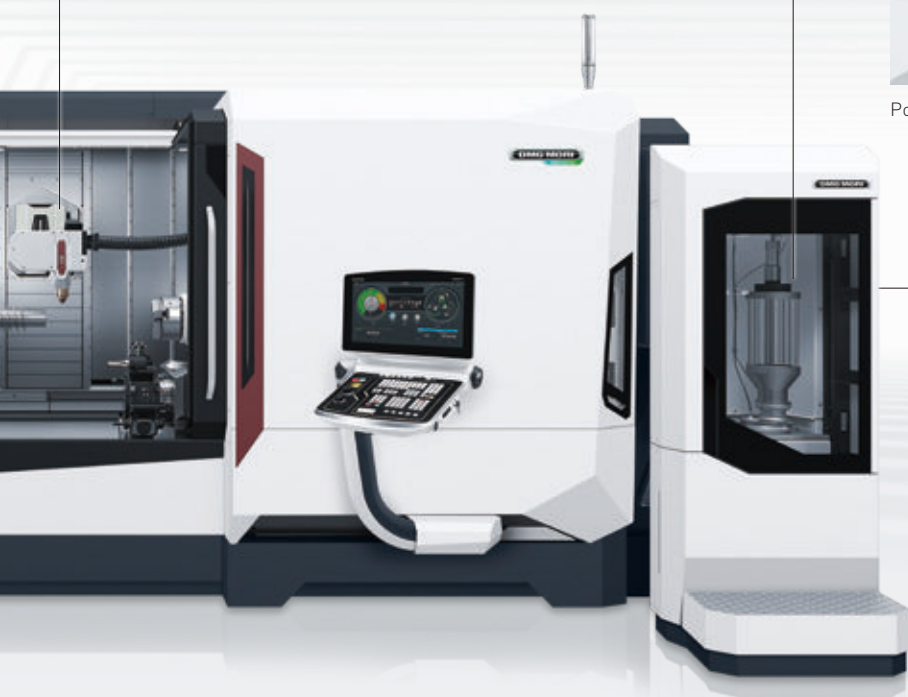
Located behind the machine, powder switching and calibration (Option)



Powder feeder with 2-hopper

## Laser transmitter

Max. power: 3 kW (4.0 HP)



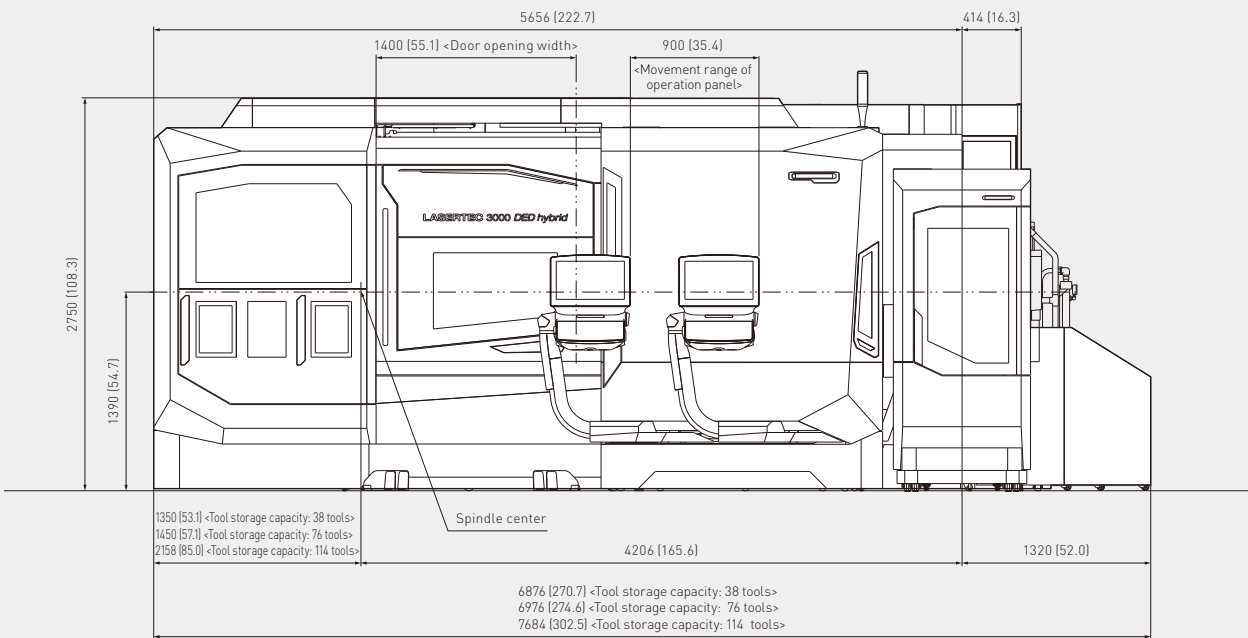
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# Machine size

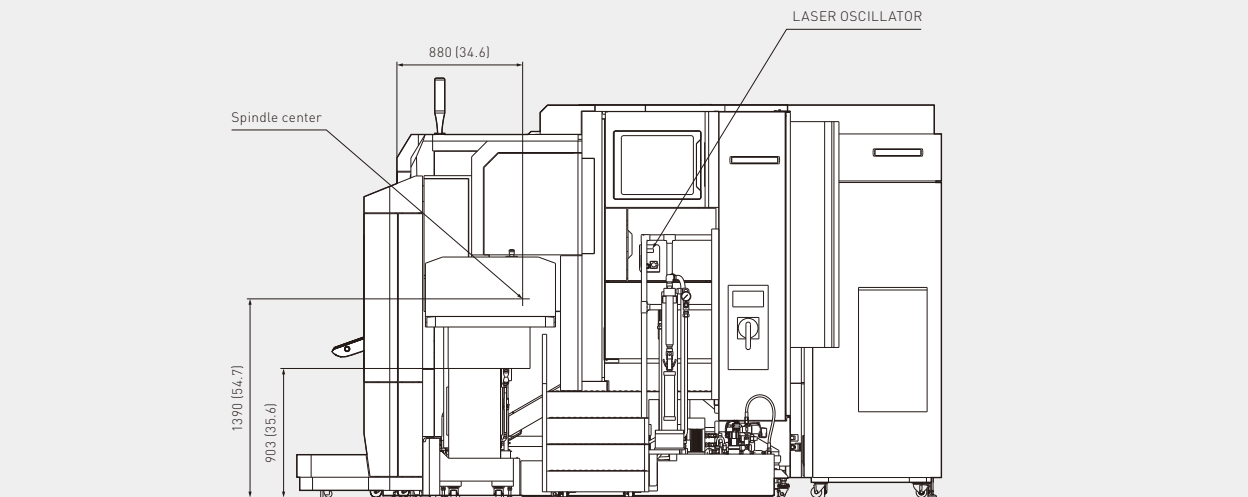
mm [in.]

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Front view



Side view



# Machine specifications

LASERTEC 3000 <i>DED hybrid</i>			
		Turning / Milling	Deposition
<b>Capacity</b>			
Swing over bed	mm [in.]	φ 700 (φ 27.6)	φ 670 (φ 26.4)
Swing over cross slide	mm [in.]	φ 700 (φ 27.6)	φ 670 (φ 26.4)
Max. distance between centers	mm [in.]	1,862 [73.3]	
Max. turning diameter (Turning / Milling spindle)	mm [in.]	φ 670 (φ 26.3)	
Max. turning diameter (Turret 2)	mm [in.]	φ 365 (φ 14.3) <12-station>, φ 325 (φ 12.7) <10-station>	—
Max. turning length	mm [in.]	1,519.3 [59.81]	1,321 [52.0]
Bar work capacity	mm [in.]	φ 102 (φ 4.0)	
<b>Travel</b>			
X1-axis (Turning / Milling spindle)	mm [in.]	675 [26.5] <-125 – +550 [-4.9 – +21.6]>	
Y1-axis (Turning / Milling spindle)	mm [in.]	300 [11.8] <±150 [±5.9]>	
Z1-axis (Turning / Milling spindle) + for ATC	mm [in.]	1,562 + 164 [61.4 + 6.4] <for ATC>	1,381 [54.3]
B-axis (Turning / Milling spindle)		240° [-30° – +210°]	180° [0° – +180°]
A-axis (Right spindle / Tailstock)	mm [in.]	1,542 [60.7]	
X2-axis (Turret 2)	mm [in.]	225 [8.8]	
Y2-Axis (Turret 2)	mm [in.]	80 [3.1] <±40 [±1.5]>	
Z2-axis (Turret 2)	mm [in.]	1,542 [60.7]	
<b>Left spindle</b>			
Max. spindle speed	min <sup>-1</sup>	3,000	
<b>Right spindle</b>			
Max. spindle speed	min <sup>-1</sup>	4,000	
<b>Turning / Milling spindle (Turret 1)</b>			
Number of tool stations		1	—
B-axis min. indexing angle		0.0001°	—
Max. tool spindle speed (Turning / Milling spindle)	min <sup>-1</sup>	12,000, 20,000*1	—
Taper hole of tool spindle (Turning / Milling spindle)		Capto C6, HSK-A63 [T63]	—
Tool storage capacity		38, 76, 114	—
Max. tool diameter	mm [in.]	φ 70 (φ 2.7)	—
Max. tool length	mm [in.]	400 [15.7]	—
Max. tool mass	kg [lb.]	8 [17.6], 10 [22.0]	—
<b>Turret 2</b>			
Number of tool stations		12 <12-station>, 10 <10-station>	—
Shank height for square tool	mm [in.]	20 [0.8] <12-station>, 25 [1.0] <10-station>	—
Max. milling spindle speed	min <sup>-1</sup>	12,000, 6,000	—
<b>AM head</b>			
B-axis min. indexing angle		—	0.0001°
Max. main laser output	kW [HP]	—	3 [4.0]
Main laser wavelength	nm	—	1,020 ± 15
Pilot laser output	mW	—	Less than 0.390
Pilot laser wavelength	nm	—	600 – 700
Spot size or Cladding size	mm [in.]	—	φ 3 [0.1], φ 1.6 [0.06]
Beam divergence	mrad	—	79, 128
Type of powder nozzle		—	MultiJet / Coaxial
Laser Class		—	Class 1
<b>Tailstock</b>			
Tailstock spindle diameter	mm [in.]	φ 110 (φ 4.3)	
Taper hole of tailstock spindle		Live center [MT5], Built-in center [MT4]	
Tailstock travel	mm [in.]	1,542 [60.7]	
<b>Motor</b>			
Motor for left spindle <SIEMENS>	kW [HP]	36 / 30 / 25 [48.0 / 40 / 33.3] <10%ED / 30 min / cont>	
Motor for right spindle <SIEMENS>	kW [HP]	26 / 22 / 15 [34.7 / 30 / 20] <10%ED / 40%ED / cont>	
Turning / Milling spindle motor <SIEMENS>	kW [HP]	20.2 / 18.8 [26.9 / 25.1] <40%ED / cont>, 20.2 / 18.8 [26.9 / 25.1] <40%ED / cont>*1	
Turret 2 milling spindle motor <SIEMENS>	kW [HP]	7.5 / 5.5 / 3.7 [10 / 7.5 / 5] <15%ED / 25%ED / cont>, 16 / 16 / 11.5 [21.3 / 21.3 / 15.3] <25%ED / 40%ED / cont>*2	
<b>Machine size</b>			
Machine height*3	mm [in.]	2,750 [108.3]	
Floor space (Width × Depth)	mm [in.]	6,876 × 4,510 [270.7 × 177.6] <Tool storage capacity: 38 tools>	
<Including a conveyor>*4	mm [in.]	6,976 × 4,510 [274.6 × 177.6] <Tool storage capacity: 76 tools>	
		7,684 × 4,510 [302.5 × 177.6] <Tool storage capacity: 114 tools>	

\*1 High-speed specifications

\*2 High-torque specifications

\*3 The machine height does not include options such as the signal tower, mist collector, etc.

\*4 Equipment such as the super-high pressure coolant and coolant chiller not included.

● Max. spindle speed / Max. milling spindle speed: Depending on restrictions imposed by the workpiece clamping device, fixture and tool used, it may not be possible to rotate at the maximum spindle speed.

● ANR: ANR refers to a standard atmospheric state; i.e., temperature at 20°C [68°F]; absolute pressure at 101.3 kPa [14.7 psi]; and relative humidity at 65%

● Power sources, Machine size: the actual values may differ from those specified in the catalogue, depending on the optional features and peripheral equipment.

● The information in this catalog is valid as of November 2021.







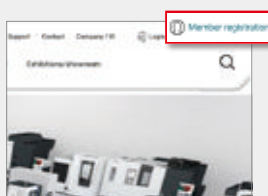
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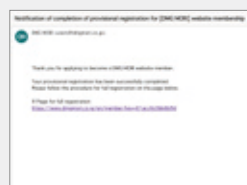
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Registration complete!

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