

Press Release

September 30th, 2021

LASERTEC 3000 *DED hybrid* Hybrid machine of 5-axis Mill-Turn & DED for Additive Manufacturing, Turning & Milling in 1 chucking

DMG MORI CO., LTD. (hereinafter referred to as “DMG MORI”) has launched LASERTEC 3000 *DED hybrid*, a hybrid machine that enables subtractive and additive metal applications in only one chucking, by merging the characteristics of turn-mill machines with the laser technology of Additive Manufacturing (hereinafter referred to as “AM”).

The market potential of AM has hugely grown in recent years, driven by the unique capability of depositing shapes impossible by conventional metal cutting. This trend is expected to continue in the future as well, as the usage of AM machines will increase in fields such as die & mold, semi-conductor electronics, medical and aerospace, while other related markets will expand as well, such the market for metal powder and deposited parts. In addition, the diversity of production methods causes more companies to shift towards high-mix low-volume production, which sparks the need for process integration of additive applications, such as coating and repairing, and subtractive applications.

LASERTEC 3000 *DED hybrid* combines turn-mill and AM technology to enable conventional metal cutting and DED^{*1} applications on just one machine. DED describes the process of applying metal powder through the powder nozzle in parallel to laser irradiation, in order to melt the metal powder and harden it again for deposition. LASERTEC 3000 *DED hybrid* offers fast deposition on large-size workpieces up to $\phi 400 \text{ mm} \times 1,321 \text{ mm}^2$. The powder feeder can switch between different types of metal powder, thus allowing the deposition of multiple powders in layers on one base material. Furthermore, different types of metal powder can be already mixed before application, in order to create composite materials and realize a diverse range of depositions, repair and coating processes.

LASERTEC 3000 *DED hybrid* is equipped with the AM head on the turning/milling spindle for simultaneous powder supply and laser irradiation, and also adds a B-axis for 5-axis DED application. The AM head is stored away during metal cutting processes; so also conventional machining doesn't require any setup changes and can be conducted in one chucking. Additionally, AM Assistant^{*3} monitors the deposition status for consistent quality and prevention of production errors, as it automatically calibrates the powder flow and detect nozzle conditions.

Please take a look at the video on our official website.

https://www.dmgmori.co.jp/en/movie_library/movie/id=5942

■Main features

① Hybrid 5-axis turn-mill and DED machine

- Process integration of 5-axis turn-mill and DED applications on a single machine
 - + 1 machine for turning, milling and additive manufacturing
 - + Simultaneous 5-axis machining by 3 linear axes (X,Y,Z), B-axis (turning/milling spindle) and C-axis (main-/counter spindle)
- Maximum workpiece size for deposition: $\phi 400$ mm \times 1,321 mm (with B-axis at 90°)
 - + Tilting the AM head (B-axis at 180°) also allows deposition of workpiece end faces with a maximum size of $\phi 670$ mm \times 932 mm
- The most compact design in its class
 - + width 6,876 mm (tool storage of 38 tools), depth 4,510 mm

② High-performance AM head

- AM head equipped on turning/milling spindle compactMASTER for simultaneous powder supply and laser irradiation
 - + Even with the AM head mounted the turning/milling spindle keeps a compact length of 550 mm
- Coaxial nozzle adopted for perfect coating applications
 - + Laser output 3 kW
 - + Different spot sizes available: 3 mm and 1.6 mm
- The AM head can be stored away in the AM head stocker if not in use
 - + Prevents cutting chips and coolant from entering the optics inside the AM head during metal cutting

③ Deposition solutions for diverse workpieces

- Coating solutions (Plating of long shafts, gear shapes, etc.)
 - + Corrosion-resistant and wear-resistant coating
- Repair solutions (turbine blades, tools, die and mold, etc.)
 - + Milling of worn parts up to deposition and finishing by simultaneous 5-axis machining in one chucking
- Cladding solutions (complete 3D components, prototyping, etc.)
 - + Deposition limited to necessary parts for material cost saving

- Deposition solutions for different types of metal (Press molds, etc.)
 - + Shorter lead times by deposition of different materials of different hardness in one chucking

④ AM Assistant*3

AM Assistant for effective operation

- Adaptive Process Control measures the melt point temperature
- Working distance monitoring from the melt point to the powder nozzle
- Automatic calibration of the powder supply by sensors
- Optical powder flow sensor for automatic powder flow adjustment
- AM Analyzer detects any adhesion of cutting chips to the powder nozzle or nozzle clogging
- AM Evaluator*4 for quality inspections of finished pieces
- Working area monitoring*4 for temperature measurement of the working area

⑤ Sophisticated maintenance functions

- Laser sensors on the machine covers, windows and others detect and stop any laser about to leak through the covers
- The powder feeder for control of powder supply is placed on the front of the machine
- Zero Sludge Coolant Tank equipped as standard to efficiently collect fine sludge inside the coolant tank
- Built-in mist collector zeroFOG equipped as standard to efficiently remove mist and maintain a clean production environment

DMG MORI will continue to attend to customer needs and launch highly functional, reliable and investment-worthy products.

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| Product name | LASERTEC 3000 <i>DED hybrid</i> |
| Target industries | Die & mold, Semi-conductor electronics, medical, aerospace, etc. |

*1 DED = Directed Energy Deposition

*2 If the AM head is vertically aligned

*3 Partly available as option

*4 Can be selected as option

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LASERTEC 3000 *DED hybrid*



Screw deposition

Concluded.