ADDITIVE MANUFACTURING
Reinvent Your Metal Production

LASERTEC 12 SLM
LASERTEC 30 SLM 2nd Gen.
LASERTEC 30 DUAL SLM
LASERTEC 65 3D
LASERTEC 65 3D hybrid
LASERTEC 125 3D hybrid
LASERTEC 4300 3D hybrid

OPTOMET - FIRST TIME RIGHT
Software for parameter optimization

NEW
NEW
LASERTEC **SLM**

Additive Manufacturing through Selective Laser Melting (SLM) in the powder bed

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LASERTEC **3D**

Directed Energy Deposition with a coaxial powder nozzle

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LASERTEC **3D hybrid**

Combination of technologies on one machine. Directed Energy Deposition with coaxial powder nozzle combined with 5-axis milling and turning for Additive Manufacturing in finished part quality
ADDITIVE TECHNOLOGIES

Full-Liner with end-to-end process knowledge

157 sales and service locations, 14 production factories, as well as 6 Additive Manufacturing Excellence Centres for optimal support worldwide.
ADDITIVE INTELLIGENCE – Start now and use the full potential of Additive Manufacturing!

The DMG MORI Academy supports companies with the introduction and use of Additive Manufacturing with a new comprehensive portfolio.

OUR SERVICES

+ Additive Manufacturing Quick Check for the identification of your specific Additive Manufacturing components
+ Redesign of your components for Additive Manufacturing
+ Engineering and design of new components and groups
+ Simulation and topology optimization
+ Production of prototypes and small series of your components
+ Courses and training for management, design and manufacturing departments
+ Consulting for the strategy from design optimisation, through to your Additive Manufacturing production
YOUR BENEFITS

+ Faster to market
+ Better products
+ Everything from a single source
+ Reduced obstacles to investment
+ Build-up of knowledge during entry in the technology

BEST PRACTICE COOLANT RING

**Sector:** Mechanical engineering  
**Material:** Aluminum  
**Quantities:** 20 p. a.

**Challenges**
+ Guidance of coolant  
+ Interfering contours due to ULTRASONIC holder  
+ Compact design

**Added value**
+ Targeted supply of coolant  
+ Cooling efficiency significantly improved  
+ Optimised chip removal

Serial component ULTRASONIC 80 eVo
Quick check as the perfect start for your design

2-DAY ON-SITE WORKSHOP AT THE CUSTOMERS

Aim: Development of basic knowledge and identification of components with Additive Manufacturing potential.

**Technical suitability**

<table>
<thead>
<tr>
<th>Component</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td><img src="image_url" alt="Diagram" /></td>
<td><img src="image_url" alt="Diagram" /></td>
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<tr>
<td>Medium</td>
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<tr>
<td>High</td>
<td><img src="image_url" alt="Diagram" /></td>
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<td><img src="image_url" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Component analysis**

- Analysis of the components
- Rating according to technical and economic viability
- Portfolio creation
- Concepts for redesign
- Roadmap development

**Target group:** The ADDITIVE MANUFACTURING Quick Check is intended for developers and design engineers. Number of participants: 4 – 10 people

**Powder nozzle holder LASERTEC 65 3D after redesign for Additive Manufacturing**

- Functional integration
- Reduction of production costs
- Enhanced cooling efficiency
- 60% lighter
- 95% fewer components
“ADDITIVE MANUFACTURING requires a new mindset. Together, we refine your additive parts and develop the full potential.”

BEST PRACTICE MIX TUBE

Client: IAB – Institut für angewandte Bauforschung gGmbH

Material: Stainless Steel

Challenges
+ Optimized Mixing
+ Cleanability
+ Minimum Adhesions

Added value
+ Pipe-in-pipe concept
+ Optimized mixing geometry
+ Perfect cleanability

Ra = 0.5 μm: Possible thanks to high-precision selective laser beam melting and additional flow grinding
Design for Additive Manufacturing

Additive Manufacturing requires innovative thinking in design. We help your development team to the next level!

**Task**

- **Traditional design**
  - Lens holder for the LASERTEC 30 SLM

- **Additive design**
  - Technology-driven: Which material do I have to **remove**?
  - Function-driven: Which material do I have to **add**?

**DESIGN TRAINING COURSES**

1. Design for Additive Manufacturing **Basic**
   - Knowledge: CAD Basics
2. Design for Additive Manufacturing **Advanced**
   - Prior knowledge: Basic training
     - **Duration**: 4.5 days each
     - **Number of participants**: Max. 8 Persons
     - **Target group**: Specialists and managers in the field of development and design
     - **Course starting times**: On-going, several times a year

**We help you with the introduction of the technology!**
Your contact person
Dr. Rinje Brandis
Head of Consulting
Additive Manufacturing

DMG MORI
Academy GmbH
Gildemeisterstr. 60
DE-33689 Bielefeld

Tel.: +49 5205 74 2575
Mobil: +49 151 7441 2703
rinje.brandis@dmgmori.com
www.dmgmori.com

TRADITIONAL DESIGN
12 SEPARATE PARTS

ADDITIVE DESIGN
1 FINISHED PART

Functional integration

BEST PRACTICE GRINDING NOZZLE

Sector: Mechanical engineering
Material: Aluminum
Quantities: 120 p. a.

Challenges
+ Guidance of coolant
+ Compact design

Added value
+ Supply of coolant over a large area
+ Optimized flow conditions

Optimized Coolant Flow

Serial component
DMU 80 P duoBLOCK

56 % LIGHTER

30 % FASTER PRINT

60 % CHEAPER

RETHINK DESIGN!
ADDITIVE TECHNOLOGIES

Unique – Global full line of products for Additive Manufacturing with powder nozzle and powder bed from a single source

Selective Laser Melting (SLM)

LASERTEC 12 SLM
LASERTEC 30 SLM 2nd Gen.
LASERTEC 30 DUAL SLM

- Additive Manufacturing in a powder bed with integrated powder recycling
- Max. workpiece dimensions:
  125 x 125 x 200 / 300 x 300 x 300 mm
Directed Energy Deposition combined with turning/milling

LASERTEC 4300 3D hybrid

- Additive Manufacturing with a powder nozzle and integrated 6-sided turn & mill machining
- Max. workpiece dimensions: ø660 x 1,500 mm, 1,700 kg

Directed Energy Deposition combined with milling

LASERTEC 65 3D hybrid

- Max. workpiece dimensions: ø500 x 400 mm, 600 kg

Directed Energy Deposition combined with milling

LASERTEC 65 3D hybrid

- First special powder nozzle machine based on a CNC machine
- Max. workpiece dimensions: ø650 x 560 mm, 600 kg

LASERTEC 125 3D hybrid

- Max. workpiece dimensions: ø1,250 x 745 mm, 2,000 kg

LASERTEC 125 3D hybrid

- Max. workpiece dimensions: ø1,250 x 745 mm, 2,000 kg

LASERTEC 65 3D hybrid

- First special powder nozzle machine based on a CNC machine
- Max. workpiece dimensions: ø650 x 560 mm, 600 kg
GLOBAL FULL LINE OF PRODUCTS FOR ADDITIVE MANUFACTURING

Four process chains for end to end Additive Manufacturing

Selective Laser Melting (SLM)

ADDITIVE MANUFACTURING IN A POWDER BED
Component size max. 300 × 300 × 300 mm

METAL-CUTTING MACHINING

Directed Energy Deposition (DED)

ADDITIVE MANUFACTURING WITH POWDER NOZZLE
Component size max. ø 650 mm, height 560 mm

ADDITIVE MANUFACTURING WITH POWDER NOZZLE IN COMBINATION WITH:
MILLING – LASERTEC 65/125 3D hybrid:
Component size max. ø 1,250 × 745 mm

TURN & MILL – LASERTEC 4300 3D hybrid:
Component size max. ø 660 × 1,500 mm

Product Line
Additive Intelligence
SLM Machines
DED Machines
DMG MORI Service
Technical Data
METAL-CUTTING MACHINING

ADDITIVE MANUFACTURING IN A POWDER BED
Component size max. 300 × 300 × 300 mm

METAL-CUTTING MACHINING

Finished part

- Grinding nozzle
- Bone plate [Wrist]
- Blow mold
- Knee implant
- PKD Milling head
- Valve housing
- Laser head console
- Turbine casing
- Diecast core
- Heat exchanger
- Rocket nozzle
Pioneer of the powder bed process with more than 20 years application experience: Selective Laser Melting

FUNCTIONAL PRINCIPLE: BUILDING A PART LAYER BY LAYER

1. Applying a layer of powder
2. Selectively melting the powder using laser light
3. After melting, the platform is lowered by the respective thickness of the layer
4. Applying a new powder layer
HIGHLIGHTS

+ Highly complex components with functional integration
+ Internal conformal cooling channels
+ Topology-optimised components
+ Simultaneous build-up of different designs
+ Weight optimisation due to lattice and honeycomb structures
+ Functional prototypes made of common materials
Applications and industries

PKD MILLING HEAD

- Material: Tool Steel
- Weight-optimized design
- Internal cooling channels
- No support structures – Directly printed on a HSK 63 tool holder

Automotive
Quick, and near production quality, functional prototypes, made from aluminium, titanium or steel. Complex parts with multiple free-form surfaces, as individual items or in small batches.

Wheel carrier

Aerospace
Customised applications made from aluminium and titanium, e.g. blades with integrated cooling channels and high-efficiency heat exchangers.

Blade

Medical
Implants such as joint or bone prostheses made from titanium. Customised, tailor-made implants. Complex lattice structures, e.g. for hip and knee implants

Knee implant

Dental
Custom-fit dental implants such as ligaments, crowns or bridges made from cobalt chrome or titanium.

Dental applications

Tool/mould making
Production of tooling inserts with conformal cooling channels. Manufacturing of prototypes and small batches.

Blow mold

General Mechanical Engineering
Economical production of prototypes and small series with functional integration.

Coolant ring nozzle
New design freedom

**POWDER NOZZLE HOLDER**  
LASERTEC 65 **3D**

1. **Functional integration:** Enhanced cooling performance via complex interior ducts and a larger surface.
2. **Production of non-assembly modules** by combining standard components with sealing and connecting elements.
3. **Lightweight design:** integrated honeycomb structure.
4. **Complex geometries:** virtually limitless construction freedom.
5. **Flexible product development** via fully digital process chain.
6. **Work scheduling:** perfect interaction between parameter optimization and machines via the in-house developed RDesigner software.
7. **Significant reductions** in production costs through tool-less production.

95% LESS PARTS

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**60% LIGHTER**
LASERTEC SLM

80% higher productivity: LASERTEC 30 DUAL SLM

**HIGHLIGHTS**

- **Additive Manufacturing in a powder bed**
  with a build volume of $300 \times 300 \times 300$ mm

- **2×600 W DUAL-laser system**
  for build rates up to 90 cm$^3$/h (optional: 2×1,000 W)

- **High-precision optics module**
  with variable focus diameter (50 μm – 300 μm)
  and active cooling

- **100% overlap of the scan fields**
  with fully digital control

- **Variable definition of scan strategies for maximum efficiency in the printing process**

- **Actively cooled build cylinder**
  for reduced set-up times

- **rePLUG – The powder module for maximum work safety and fast material changeover <2 hours**

- **CELOS: Consistent software solution**
  from CAM programming with the RDesigner through to machine control

**NEW: Permanent filtration system**

- Filter lifetime > 3,000 hours
- Material-independent operation
- No consumables
- Automatic passivation of metal dusts for highest work safety
100% OPEN SYSTEM

Individual adjustment of all machine settings and process parameters as well as unrestricted choice of material suppliers.

Unique precision for minimal wall thicknesses and finest lattice structures.
LASERTEC SLM

LASERTEC 30 SLM 2nd Gen.

HIGHLIGHTS

+ Additive Manufacturing in a powder bed
  with a build volume of 300 \times 300 \times 300 \text{mm}

+ Application-specific fibre laser sources of
  600 W as standard and up to 1,000 W optional

+ Dynamic adjustment of the focus diameter
  between 70 and 200 \mu m for maximum productivity

+ rePLUG – The powder module for maximum
  occupational safety and fast material changeover
  < 2 hours

+ CELOS: Consistent software solution
  from CAM programming through to machine control

+ 100 % open system:
  Individual adjustment of all machine settings
  and process parameters
**rePLUG reSEARCH**

The additional powder module developed especially for material and process parameter development before series production.
High-precision Selective Laser Melting: LASERTEC 12 SLM

HIGHLIGHTS

+ Additive Manufacturing in a powder bed with a build volume of 125 × 125 × 200 mm
+ Application-specific fibre laser sources of 200 W as standard and up to 400 W optional
+ 35 µm focus diameter for maximum precision
+ rePLUG – The powder module for maximum occupational safety and fast material changeover < 2 hours
+ CELOS: Consistent software solution from CAM programming with the RDesigner through to machine control
+ 100% open system: Individual adjustment of all machine settings and process parameters

Unique precision for minimal wall thicknesses and finest lattice structures
OPTOMET – FIRST TIME RIGHT

Expert knowledge at your fingertips – OPTOMET software enables the development of process parameters for new materials within minutes.
rePLUG – The powder module for fast material changeover

HIGHLIGHTS

+ Automated powder handling and powder storage under inert gas atmosphere
+ One material per rePLUG – expansion of the material range at will thanks to modular changeover system
+ Change between different materials without contamination in < 2 hours
+ Safe powder handling due to integrated periphery and closed material cycle
+ Increased efficiency thanks to integrated powder recycling
+ High process reliability thanks to efficient double filter system* (filter can be changed without interrupting the building process) and a large powder reservoir (no manual refilling during the process)

Optional: rePLUG reSEARCH
The additional powder module developed especially for material and process parameter development before series production.

*when using the rePLUG for LASERTEC 12 SLM and LASERTEC 30 SLM 2nd Gen.
FULLY COMPATIBLE

Use the same rePLUG and rePLUG reSEARCH on LASERTEC SLM machines without any adaptation.

MATERIAL CHANGE

< 2h

1. Sieving unit
2. Buffer tank
3. Powder supply process area
   Powder return process area
4. Main tank
5. Powder transport within the inert gas volume flow
POWDER RANGE

DELIVERY

READY-TO-USE
Supply of material and process parameters

DELIVERY
within 3 days (inside EU)

QUALIFIED
Compliance with all required QS standards Powder acceptance on a LASERTEC SLM

POWDER RANGE
+ 1.2709 (Tool Steel)
+ 1.4404 (Stainless Steel)
+ AlSi10Mg0.5 (Aluminium)
+ CoCr ASTM F75 (Cobalt-Chrome)
+ CoCr (Starbond CoS
+ Inconel 625
+ Inconel 718
+ Scalmalloy®
+ Ti6Al4V/3.7165 (Titanium)
LASERTEC SLM WITH rePLUG
The powder module for fast material change and automated powder handling

EASY ORDER ONLINE
Complete powder assortment available in our DMG MORI Online Shop:
shop.DMGMORI.com

MATERIAL CHANGE < 2 h

OPTOMET – FIRST TIME RIGHT
Software for parameter optimization in the powder bed process
CELOS ensures an efficient flow of information on the shop floor and provides the machine operator with all relevant job information in real time. Touchscreen and APPs ensure intuitive operation of the machine, while various monitoring tools enable a clear view of the current process at all times.

CONTROL AND PROGRAMMING

CELOS: CAM programming and machine control from a single source

MATERIAL MANAGEMENT
Management of material data and parameter editor

MANUAL CONTROL
Machine setup for process preparation

JOB CONTROL
Machine control

JOB HISTORY
Job management

CELOS APPS

RDesigner
CAM programming

WATCHER
Camera-based process monitoring and documentation of each individual layer

STATUS MONITOR
Visualisation of the machine status in real time

NETservice
Online error analysis and technical support directly on the machine control

SETTINGS
Machine settings
OPTOMET: Automatic calculation of process parameters

+ Parameter development for new and existing materials within minutes instead of days.
+ Up to 50% more efficiency with OPTOMET Max. Power*
+ Advance calculation of mechanical properties for selected materials.
+ 70% shorter material development cycles with unrestricted choice of the material supplier.
+ Better after every print job – "Machine learning" with integrated database.

*R:Exclusive function for LASERTEC SLM

Create your own parameter sets by mouse click!

Automatic calculation of:
1. Laser power
2. Scan speed
3. Hatch-Spacing

Each for:
- Hatch
- Up-/Downskin
- Top-Skin
- Outer-/Inner-Contour

RANGE OF FUNCTIONS

Parameter development

Automatic process parameter calculation and optimization for new and existing Additive Manufacturing materials incl. advance calculation of the material properties and mechanical properties for OPTOMET standard materials:
+ Aluminum AISi10Mg0.5
+ Stainless steel 1.4404
+ Stainless steel 17-4 PH
+ Tool steel 1.2709
+ Inconel 625
+ Inconel 718
+ Cobalt chrome
+ Titanium Ti64

INDIVIDUAL PARAMETER ADJUSTMENT FOR MAXIMUM FLEXIBILITY

+ Change of layer thickness
+ Adaptation of mechanical properties like density or hardness
+ Parameter correction for recycling powder
+ Switching to new powder suppliers for an unrestricted choice of material manufacturers

CREATING YOUR OWN PARAMETER SETS!
COMPONENT QUALITY

First time right
Consideration of powder and machine properties for perfect results

- Chemical composition
- Powder flowability
- Powder density
- Layer thicknesses for support and component
- Focus diameter (min./max.)
- Build platform temperature (max.)

"Machine learning”
The integrated material database can be extended with the results of each material test and thus creates the basis for a self-learning machine, which keeps getting better with each print job.

Advance calculation of the material properties and mechanical properties for selected materials

1. Density 4. Yield point
2. Surface hardness 5. Elongation at break
3. Tensile strength 6. Impact strength

*Currently only for OPTOMET standard materials

EXCLUSIVE FUNCTIONS FOR LASERTEC SLM

OPTOMET Max. Power and Temperature Control

50 % increased efficiency with unchanged component quality

- Optimized exposure strategies by using the full laser power and adjusting the scan speed as well as hatch spacing
- Optimum utilization of the machine performance with up to 50 % higher build-up rates

OPTOMET Temperature Control
Reduced residual stresses in the component due to active control of the build platform temperature for constant conditions at process level
Create your own parameter sets! OPTOMET Advanced: Choice of any alloy compositions* by mouse click based on the periodic table

70% shorter material development cycles

OPTOMET Advanced + rePLUG reSEARCH
+ Perfectly coordinated software and hardware particularly for the material development
+ Minimization of required material tests and machine runtime
+ Optimized for small material quantities with cleaning times < 1 day
+ Parameter development on the series system

HARDWARE: rePLUG reSEARCH

WITHIN DAYS INSTEAD OF MONTHS!

OPTOMET VERSIONS

OPTOMET Basic and Advanced

<table>
<thead>
<tr>
<th>Range of functions / material selection</th>
<th>Basic</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic calculation of process parameters</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Individual parameter adjustment and optimization</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Advance calculation of mechanical properties*</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>OPTOMET Max. Power function**</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>OPTOMET Temperature Control**</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Machine Learning: Feedback of the measuring results to the local OPTOMET material database</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>OPTOMET standard materials</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Aluminum AlSi10Mg0.5, Stainless steel 1.4404, Stainless steel 17-4 PH, Tool steel 1.2709, Inconel 625, Inconel 718, Cobalt chrome, Titanium Ti64</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Material development for any alloy compositions***</td>
<td>-</td>
<td>✔</td>
</tr>
<tr>
<td>Selection of material components via the periodic table</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

* Weldable materials within the chemical and physical limits only in connection with OPTOMET Advanced Version
** Exclusive function for LASERTEC SLM machines
*** Weldable materials within the chemical and physical limits

* Currently only for OPTOMET standard materials
Programming and control

**CAM programming**
+ Starts with a pure CAD model (STL)
+ Orientation/Positioning
+ Support
+ Slicing
+ Hatching
+ Copying
+ Generation Process Control File

**Heat Calculation**
+ Advance calculation of mass distribution
+ Automatic adaptation of all laser parameters for top component quality
+ Integration in RDesigner

**JOB CONTROL**
+ At a glance: All relevant machine and job parameters
+ Camera-based check of the build-up and coating quality
+ Automatic machine stop at error detection
**STATUS MONITOR**
- Visualisation of the machine status in real time
- Graphic display of all sensors
- Definition of favoured sensors

**MANUAL CONTROL**
- Summary of the machine status
- Machine setup
- Process preparation
- Fault diagnostics
- Manual control of scanner, lens, valves and drives

**MATERIAL MANAGEMENT**
- Management of material data (Process Control Files)
- Grouping of available materials
- Definition of user-defined machining strategies
- Simple import and export of material data
SLM PROCESS CHAIN

Process understanding from the drawing to the finished part, with end to end process knowledge of DMG MORI

Additive Manufacturing → Milling

Maximum component accuracy and top surfaces guaranteed – Post-processing on milling machines from DMG MORI

DMU 50 3rd Gen.

HIGHLIGHTS

+ 5-axis machining with up to 20,000 rpm
+ Swivel rotary table for 5-axis simultaneous machining
+ Tool magazine with 30 pockets as standard and optionally up to 120 magazine pockets
+ Integrated cooling concept for top long-term precision
+ Direct-driven ball screw drive for the best possible accuracy
+ Direct measuring system in all axis
**Milling → Additive Manufacturing**

**Full flexibility** – Milling of the base before the Additive Manufacturing process does away with the need for support structures and leads directly to the finished part!

**Application example:**

**Basic tibia plateau**

- **Material:** Ti6Al4V
- **Machining time milling:** 12 min./unit
- **Machining time additive manufacturing:** 9 hours (9 parts)
- **Layer thickness:** 50 µm
- **Dimensions:** 75 × 57 × 53 mm

**Zero-Point Clamping System by SCHUNK**

**NEU:** Zero-Point Clamping System for a standardized interface across the complete process chain

**DIRECTLY TO THE FINISHED PART!**

- **No post-processing**
- **No support structures**
Directed Energy Deposition (DED) Laser Deposition Welding

FUNCTIONAL PRINCIPLE: TRACK-FOR-TRACK BUILDING IN LAYERS

1. The powder is transported by an inert carrier gas to the coaxial powder nozzle
2. Laser melts the metal powder to a high-strength and high-density weld
3. Individual tracks become one layer
4. Layers become the 3D component

HIGHLIGHTS

+ 5-sided additive process
+ Addition of additive features to existing parts
+ Coating and repair of existing parts
+ Targeted buildup of specific materials to enhance the workpiece function or enlarge the tool life.
+ Large honeycomb structures for weight reduction
+ Combination of multiple materials in one part
+ Building near-net semi-finished products
+ High-quality welding
## Applications
- New parts / complete build up
- Build-up on semi-finished products
- Also for Repair and coating
- Multi materials and graded materials

## Materials
- Dense and high-strength materials up to 65 HRC without heat treatment
- Raw material Particle size 50 – 120 μm
- No reactive materials (e.g. Ti, Al)
- Titanium possible (Ti-6Al-4V)
- Particle size 45 – 200 μm

## Post-processing
- The parts must be post-processed on a separate machine
- Post-processing in a single setup on the same machine, based on 5-axis milling
- Hybrid machine with 5-axis milling (optionally with mill-turn function)
- Post-processing in a single setup on 5-axis milling
- Hybrid machine with 5-axis milling (no turn function)
- Post-processing in a single setup on 5-axis milling
- Hybrid machine 6-sided machining: Turning / milling

## Build volume

<table>
<thead>
<tr>
<th>Machine</th>
<th>Build volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>LASERTEC 65 3D hybrid</td>
<td>max. ø650 mm</td>
</tr>
<tr>
<td>LASERTEC 125 3D hybrid</td>
<td>max. ø500 mm</td>
</tr>
<tr>
<td>LASERTEC 4300 3D hybrid</td>
<td>max. ø1,250 mm</td>
</tr>
</tbody>
</table>

## Footprint

<table>
<thead>
<tr>
<th>Machine</th>
<th>Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>LASERTEC 65 3D hybrid</td>
<td>1.6 m³</td>
</tr>
<tr>
<td>LASERTEC 125 3D hybrid</td>
<td>27 m³</td>
</tr>
<tr>
<td>LASERTEC 4300 3D hybrid</td>
<td>50 m³</td>
</tr>
</tbody>
</table>

### FROM PROTOTYPE TO SERIES PRODUCTION

- **2013**: World premiere of the LASERTEC 65 3D hybrid as a prototype
- **2014**: Start of series production of the LASERTEC 65 3D hybrid for Additive Manufacturing using a powder nozzle
- **2017**: World premiere of the LASERTEC 65 3D for workpieces up to ø1,250 mm and up to 2,000 kg workpiece weight
- **2019**: Start of series production of the LASERTEC 125 3D hybrid for workpieces up to ø1,250 mm and up to 2,000 kg workpiece weight
Directed Energy Deposition Materials

**MATERIALS**

- Stainless steel 316L [X2CrNiMo17-12-2, 1.4404]
- Stainless steel 17-4 PH [X5CrNiCuNb17-4-4, 1.4548]
- Tool steels X35CrMoMn7-2
- High-speed steel M2 (S6-5-2, 1.3343)
- Nickel-based alloys 625 and 718
- Cobalt alloys 6 and 21
- Copper alloys CuSn10 and CuAl10
- MMC coating (WC in nickel-based matrix)

### Typical Mechanical Properties

<table>
<thead>
<tr>
<th></th>
<th>316L as printed</th>
<th>17-4 PH age hardened</th>
<th>X35CrMoMn7-2 tempered</th>
<th>Ni 625 as printed</th>
<th>Ni 718 age hardened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield point $R_{p0.2}$ Mpa</td>
<td>390</td>
<td>1,053</td>
<td>1,346</td>
<td>538</td>
<td>1,089</td>
</tr>
<tr>
<td>Tensile strength $R_m$ Mpa</td>
<td>563</td>
<td>1,134</td>
<td>1,561</td>
<td>844</td>
<td>1,268</td>
</tr>
<tr>
<td>Elongation at break $A$ %</td>
<td>36.6</td>
<td>7.6</td>
<td>4.7</td>
<td>28.9</td>
<td>17.7</td>
</tr>
<tr>
<td>Impact strength $J$ J</td>
<td>105</td>
<td>17</td>
<td>16</td>
<td>52</td>
<td>45</td>
</tr>
</tbody>
</table>

**MULTI-MATERIAL**

Combination of two different materials in one component (e.g. material bond stainless steel/bronze). Two individually selectable powder feeders allow the combination of various materials, even the building of “Sandwich” workpieces.

**GRADED MATERIALS**

Targeted control of the transition between two materials. This results in graded materials, which show a fluent transition of different material properties. This way, the hardness and toughness of the material can be regulated for example in the build-up process, and optimally adapted to the specific requirements of the area of application.
Directed Energy Deposition Applications

**PRODUCTION**
- Heat exchanger
- Tool
- Blade
- Laser head console
- Impeller
- Propeller
- Bell
- Moulding tool
- Catalyser

**REPAIR & MAINTENANCE**
- Valve housing
- Die cast core
- Drill head
- Moulding tool
- Bland/Blades
- Forging die

**COATING**
- Cutting knife
- Flange
- Bearing block
LASERTEC 3D / 3D hybrid

Hybrides CAD/CAM – module for additive programming

1: Customer CAD/CAM data; CAD model separation into additive and subtractive areas; slicing of the individual workpiece sections

2: Generation of the NC paths for the laser process and milling; output by post processor; definition of programming order

3: 3D simulation for collision protection with consideration of the integrated laser head

4: Directed Energy Deposition and milling combined on the LASERTEC 45 3D hybrid / LASERTEC 125 3D hybrid / LASERTEC 4300 3D hybrid (flexible changeover possible)

HIGHLIGHTS

+ One software package for the complete process (design, programming, simulation)
+ Unique SAUER LASERTEC build-up module – fully integrated into CAD/CAM software
+ The part can be programmed in several steps, while flexibly switching between Laser Deposition Welding and milling operations in only one programming set-up

APPLICATION EXAMPLE

1: Start of the additive buildup

2: Additive buildup of the heat exchanger housing with two different materials

3: Intermediate milling of the flange connection

4: Additive buildup of the flange connection with same material as inner core

5: Milling of the outer flange connections to finished size

6: Finishing of the bottom part after rechucking and measuring

Dual channel heat exchanger
Plant engineering
Material: CuAL10 / 316L
Dimension: ø 200 mm x 250 mm
Cycle time: 22 h
Hybrides CAD/CAM – Highlights/Features

“Graded Materials”
+ Automatic interpolation between two parameter sets along a defined trajectory
+ Also usable for complex geometries
+ Fast programming possible with the NX material database

“Tube Additive Buildup”
+ Build-up of curved geometries (filled, thick or thin wall)
+ Automatic generation of the tool path based on the component curve
+ Increased flexibility in production

“Merge”
+ Simultaneous build-up of individually programmed operations
+ Prevention of collisions due to parallel setup of features
+ Combined setup of features with different parameters, materials or geometries

“3D Freeform”
+ Build-up on complex, existing surfaces
+ Coatings, thin walls and full components
+ Flexibility with regard to programming

“Build on parts”
+ This is based on an existing part (build-up by Additive Manufacturing or with an alternative production process)
+ “Flanging” of an additional 3D contour onto the existing part

“3D-Coating”
+ Deposition of partial or complete coatings for corrosion protection and wear resistance, “3D coating” on 3D parts as a material coating or a repair
LASERTEC 3D/3D hybrid

AM Assistant for a holistic process data capture and regulation

HARDWARE COMPONENTS

- Adaptive process control
- Distance control
- Working room observation
- Powder calibration

SOFTWARE COMPONENTS

- AM Analyser
- AM Guard
- Nozzle adhesion detection

Technical Data

NEW

Additive Intelligence
SLM Machines
DED Machines
DMG MORI Service
Technical Data
**HIGHLIGHTS**

+ Visualization of relevant process data (for example, melt pool size, powder mass flow) as a digital 3D model and over time
+ Detailed analysis of process data
+ Direct comparison of processes for quality assurance
+ Creation of part reports

**CUSTOMER BENEFITS**

+ Simplification of process development
+ Support in quality control
+ Enables individual analysis and work up of process-relevant data
+ Easy retrofitting of the software within the AM-Analyzer product package (Existing software can still be used)

--

**LASERTEC 3D / 3D hybrid**

**AM Evaluator for process data analysis and comparison**

**NEW**

**HIGHLIGHTS**

+ Visualization of relevant process data (for example, melt pool size, powder mass flow) as a digital 3D model and over time
+ Detailed analysis of process data
+ Direct comparison of processes for quality assurance
+ Creation of part reports

**CUSTOMER BENEFITS**

+ Simplification of process development
+ Support in quality control
+ Enables individual analysis and work up of process-relevant data
+ Easy retrofitting of the software within the AM-Analyzer product package (Existing software can still be used)
Uncompromising 5-axis buildup of additive parts by powder nozzle

HIGHLIGHTS

+ Directed Energy Deposition based on a machine tool with CNC control
+ 5-Axis building of large additive 3D metal parts up to ø 650 mm, 560 mm in Z (max. 600 kg)
+ Laser head integrated into the headstock
+ Programmable realisation of different track widths (ø 1.8 – 3.6 mm)
+ Complete hybrid CAD/CAM process chain with interface for subtractive post-processing
+ Customised automation solutions available for best utilisation in production
LASERTEC 65 3D

Automation and process chain: Custom-made solutions for your production

+ Synchronized interaction of additive and subtractive technologies
+ Optimal operator accessibility to both machines
+ Well suited solution for series production
+ Quick and cost-efficient production of large number of pieces

APPLICATION BENEFITS
+ Better part performance due to multi material use
+ Buildup of new features on existing 3D parts
+ Repair by directed energy deposition
Directed Energy Deposition and 5-axis milling in finished part quality

HIGHLIGHTS

+ Flexibility of additive manufacturing combined with the precision of milling
+ Laser buildup of the workpiece with intermediate milling operation
+ High building-rates with coaxial powder nozzle
+ Buildup of parts without support geometries due to 5-axis deposition process
+ New AM Assistant for best process reliability and comprehensive traceability
APPLICATION BENEFITS

+ Better part performance due to multi material use
+ Buildup of new features on existing parts
+ Complete part repair
  - Repair preparation by milling
  - Repair by laser deposition welding
  - Finishing by milling
  - All in one clamping

1 Milling spindle
2 Automatic tool changer
3 Laser head change shuttle
4 GGG 60 cast

AXIS-VERSION AUTOMATIC HEAD CHANGE COOLANT POSSIBLE CELOS + CAD/CAM
LASERTEC 125 3D hybrid

Directed energy deposition combined with 5-axis milling, for building and repairing of high-value metal parts

MACHINE FEATURES

+ Parts up to 1,250 mm building diameter, 745 mm height and 2,000 kg weight
+ High metal building rate
+ Graded and multi-material building
+ 5-axis simultaneous milling with coolant
+ New AM Assistant for best process reliability and comprehensive traceability
APPLICATION BENEFITS

+ Better part performance due to multi material use
+ Buildup of new features on existing parts
+ Complete part repair
  – Repair preparation by milling
  – Repair by laser deposition welding
  – Finishing by milling
  – All in one clamping
Directed Energy Deposition with integrated turning/milling

The LASERTEC 4300 3D hybrid expands the range of hybrid machines with a turn/mill machine for the ideal manufacture of rotational parts. The main and sub-spindles allow 6-sided machining of parts, including the welding of pipes by automated sub-spindle handling.

HIGHLIGHTS

+ Combined Laser Deposition Welding and turning/milling operations on the LASERTEC 4300 3D hybrid
+ Large parts up to ø660 mm, 660 mm in Z (axial) or ø545 mm, 1,500 mm in Z (rotational)
+ Max. workpiece weight 1,700 kg
+ Top surface quality and precision due to the integrated 6-axis turning machine
+ Additive manufacturing of metals and reactive materials such as Ti-6Al-4V (optional)
+ Complete hybrid CAD/CAM process chain
ADDITIVE AND SUBTRACTIVE MACHINING ON MAIN AND SUB-SPINDLE

- Complete 6-sided machining of parts
- Build-up of parts on main and sub-spindle with subsequent welding of built-up parts
- Automated way to weld separate parts together on the main and sub spindles

FOOTPRINT

BUILD VOLUME

LASERTEC 65 3D
- ø 560 mm
- max. 600 kg
- 540 mm

LASERTEC 65 3D hybrid
- ø 500 mm
- max. 600 kg
- 460 mm

LASERTEC 125 3D hybrid
- ø 1,250 mm
- max. 2,000 kg
- 745 mm

LASERTEC 4300 3D hybrid
- ≈ 63 m³
- 1,300 mm
- 660 mm
- 375 mm
- 265 mm
- ø 660 mm
- ø 250 mm
- ø 200 mm
DMG MORI SERVICE

Worldwide Service

NETservice – YOUR ACCESS TO DIGITAL SERVICE

+ Shorter waiting times due to routing directly to the next free employee
+ Higher resolution rate due to access to CELOS, IPC and NC
+ Maximum data security
+ Optional connection of the SERVICEcamera: More efficient problem resolution due to livestream (video/audio/image) from the machine directly to the DMG MORI Hotline
+ Recording of all service activities
+ Direct transfer of document updates
+ Multi-user conference: Interconnection of different DMG MORI skilled workers for joint faster problem resolution
+ Intuitive operation
+ Individual user profiles and rights
+ Also for existing machines thanks to the Retrofit-Kit

ONLINE SUPPORT MINIMIZES MACHINE DOWN TIMES AND SERVICE COSTS.

We solve more than 60% of the problems with our NETservice due to qualified online diagnosis and help very crucial doing your machines back in operation as fast as possible. Via direct remote communication with the DMG MORI service our expert knowledge is available immediately.
SERVICEcamera-LIVESTREAM FOR THE NETservice

+ Plug-and-play connection without preconfiguration between SERVICEcamera and NETservice (IoTconnector)
+ Faster problem identification and resolution
+ A description of the problem by phone is often superfluous
+ Faster problem identification and resolution
+ Integrated lighting and laser pointer
+ Photo and video storage on the camera and IoTconnector for subsequent use

REMOTE SUPPORT WITH CAMERA AND MULTI-USER CONFERENCE

The new NETservice enables several parties to be interconnected in a multi-user process. This allows operators, service experts, service technicians or other employees from machine manufacturing plants to work together.

+ Faster problem solving due to communication network
+ Immediate access to professional expertise

Participants
Operators, service experts, service technicians and, where necessary, experts from the plant can work together within the communication network to provide maintenance and support.

SERVICEcamera
Targeted support for the operation and maintenance of your machine made possible by real-time transmission.

Whiteboard
The whiteboard is a digital sketch paper for conference partici-pants. Together, they can work on photos, screenshots and circuit diagrams (e.g., marking, circling or underlining).

Text conference
In the chat session, all text messages are immediately sent to conference participants via instant messaging.
LASERTEC 30 DUAL SLM

Floor plans

Front view

Top view
**Technical data**

### Connections

#### Electrical connection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains connection</td>
<td>3N/PE</td>
</tr>
<tr>
<td>Nominal voltage (V)</td>
<td>400 V/230 V ±10%</td>
</tr>
<tr>
<td>Frequency (Hz)</td>
<td>50/60</td>
</tr>
<tr>
<td>Power consumption (kVA)</td>
<td>20.3</td>
</tr>
<tr>
<td>Required mains fuse (A)</td>
<td>35</td>
</tr>
<tr>
<td>Required short-circuit power (kVA)</td>
<td>250</td>
</tr>
</tbody>
</table>

#### Inert gas connection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inert gas</td>
<td>Argon</td>
</tr>
<tr>
<td>Purity</td>
<td>4.6 or higher</td>
</tr>
<tr>
<td>Minimum consumption per build (l)</td>
<td>1,000</td>
</tr>
<tr>
<td>Average consumption (l/h)</td>
<td>150</td>
</tr>
<tr>
<td>Min. Pressure (bar)</td>
<td>6 – 8</td>
</tr>
</tbody>
</table>

#### Network connection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection type</td>
<td>RJ-45</td>
</tr>
</tbody>
</table>

### Compressed air supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Pressure (bar)</td>
<td>6 – 8</td>
</tr>
</tbody>
</table>

### Build data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build volume (X × Y × Z)</td>
<td>300 × 300 × 300</td>
</tr>
<tr>
<td>Layer thicknesses (µm)</td>
<td>20 – 100</td>
</tr>
<tr>
<td>Focus diameter (µm)</td>
<td>50 – 300</td>
</tr>
<tr>
<td>Laser type</td>
<td>Fibre laser</td>
</tr>
<tr>
<td>Laser power (W)</td>
<td>2 × 600; 2 × 1,000 (optional 1 × 600; 1 × 1,000)</td>
</tr>
<tr>
<td>Material</td>
<td>Tool steel, stainless steel, cobalt chrome alloys, titanium, aluminium</td>
</tr>
<tr>
<td>Software</td>
<td>CELLOS/RDesigner</td>
</tr>
<tr>
<td>Integrated powder extraction</td>
<td>Yes (in rePLUG powder module)</td>
</tr>
<tr>
<td>Integrated sieving unit</td>
<td>Yes (in rePLUG powder module)</td>
</tr>
</tbody>
</table>

### Machine weight

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine (kg)</td>
<td>1,400</td>
</tr>
<tr>
<td>rePLUG powder module (without powder) (kg)</td>
<td>600</td>
</tr>
</tbody>
</table>
LASERTEC 12 SLM / LASERTEC 30 SLM 2nd GEN.

Floor plans

Front view

Top view

Identical for LASERTEC 12 and LASERTEC 30 SLM 2nd Gen. / LASERTEC 12 SLM does not have an external cooler
# Technical data

## Connections

<table>
<thead>
<tr>
<th></th>
<th>LASERTEC 30 SLM 2nd Gen.</th>
<th>LASERTEC 12 SLM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical connection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mains connection</td>
<td>(3N/PE)</td>
<td>(3N/PE)</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>400V/230V ± 10%</td>
<td>400V/230V ± 10%</td>
</tr>
<tr>
<td>Frequency</td>
<td>Hz</td>
<td>Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>kVA</td>
<td>kVA</td>
</tr>
<tr>
<td></td>
<td>17.3</td>
<td>17.3</td>
</tr>
<tr>
<td>Required mains fuse</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Required short-circuit power</td>
<td>kVA</td>
<td>kVA</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td><strong>Inert gas connection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inert gas Argon</td>
<td></td>
<td>Argon Argon</td>
</tr>
<tr>
<td>Purity</td>
<td>4.6 or higher</td>
<td>4.6 or higher</td>
</tr>
<tr>
<td>Minimum consumption per build (floods and large parts)</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td></td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Average consumption</td>
<td>l/h</td>
<td>l/h</td>
</tr>
<tr>
<td></td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Min. Pressure</td>
<td>bar</td>
<td>bar</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Gas connection</td>
<td>Connector D 10 mm</td>
<td>Connector D 10 mm</td>
</tr>
<tr>
<td><strong>Network connection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection type</td>
<td>RJ-45</td>
<td>RJ-45</td>
</tr>
<tr>
<td><strong>Build data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build volume (X × Y × Z)</td>
<td>300 × 300 × 300</td>
<td>125 × 125 × 200</td>
</tr>
<tr>
<td>Layer thicknesses</td>
<td>µm</td>
<td>µm</td>
</tr>
<tr>
<td></td>
<td>20 – 100</td>
<td>20 – 100</td>
</tr>
<tr>
<td>Focus diameter</td>
<td>µm</td>
<td>µm</td>
</tr>
<tr>
<td></td>
<td>min. 70</td>
<td>min. 35</td>
</tr>
<tr>
<td>Laser type</td>
<td>Fibre laser</td>
<td>Fibre laser</td>
</tr>
<tr>
<td>Laser power (depending on version)</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>600 – 1,000</td>
<td>200 – 400</td>
</tr>
<tr>
<td>Material</td>
<td>Tool steel, stainless steel, cobalt chrome alloys, titanium, aluminium</td>
<td>Tool steel, stainless steel, cobalt chrome alloys, titanium, aluminium</td>
</tr>
<tr>
<td>Software</td>
<td>CELOS / RDesigner</td>
<td>CELOS / RDesigner</td>
</tr>
<tr>
<td>Integrated powder extraction</td>
<td>Yes (in rePLUG powder module)</td>
<td>Yes (in rePLUG powder module)</td>
</tr>
<tr>
<td>Integrated sieving unit</td>
<td>Yes (in rePLUG powder module)</td>
<td>Yes (in rePLUG powder module)</td>
</tr>
<tr>
<td><strong>Machine weight</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine</td>
<td>kg</td>
<td>kg</td>
</tr>
<tr>
<td></td>
<td>1,200</td>
<td>1,200</td>
</tr>
<tr>
<td>rePLUG powder module (without powder)</td>
<td>kg</td>
<td>kg</td>
</tr>
<tr>
<td></td>
<td>540</td>
<td>540</td>
</tr>
</tbody>
</table>
## LASERTEC 65 3D

### Technical data

<table>
<thead>
<tr>
<th>Work area/Drives</th>
<th>mm</th>
<th>735/650/560</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel in X/Y/Z</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work table/workpieces</th>
<th>mm</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Workpiece dimensions</td>
<td></td>
<td>ø 650 × 560</td>
</tr>
<tr>
<td>Max. Workpiece weight (NC swivel/rotary table)</td>
<td>kg</td>
<td>600</td>
</tr>
<tr>
<td>Rotary axis (C-axis)</td>
<td>Grad</td>
<td>360</td>
</tr>
<tr>
<td>Swivel range (A-axis)</td>
<td>Grad</td>
<td>-120 to +120</td>
</tr>
<tr>
<td>Pₚ under VDI/DGQ 3441 (C-axis/A-axis)</td>
<td>Ws</td>
<td>7/9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laser source</th>
<th>Watt</th>
<th>3,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber guided diode laser</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focal distance (fixed)</td>
<td>mm</td>
<td>300</td>
</tr>
<tr>
<td>Laser spot diameter 1 (standard)</td>
<td>mm</td>
<td>3</td>
</tr>
<tr>
<td>Laser spot diameter 2 (optional)</td>
<td>mm</td>
<td>1.2–3.6</td>
</tr>
<tr>
<td>Build-up rate (depending on material)</td>
<td>kg/h</td>
<td>1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Linear axes (X/Y/Z)</th>
<th>mm</th>
<th>40/40/40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid traverse speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. acceleration X/Y/Z</td>
<td>m/sec²</td>
<td>6/6/6</td>
</tr>
<tr>
<td>Pₚ per VDI/DGQ 3441</td>
<td>mm</td>
<td>0.008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Machine data</th>
<th>mm</th>
<th>2,614 × 3,825 × 2,912</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width × depth × height (basic machine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine weight</td>
<td>kg</td>
<td>11,000</td>
</tr>
</tbody>
</table>
LASERTEC 65 3D

**Floor plan**

**Front view**

**Top view**
**LASERTEC 65/125 3D hybrid**

## Technical data

<table>
<thead>
<tr>
<th>Work area/Drives</th>
<th>LASERTEC 65 3D hybrid</th>
<th>LASERTEC 125 3D hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel in X/Y/Z</td>
<td>mm 735/650/560</td>
<td>mm 1,335/1,250/900</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work table/workpieces</th>
<th>LASERTEC 65 3D hybrid</th>
<th>LASERTEC 125 3D hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (NC swivel/rotary table) mm</td>
<td>Ø650</td>
<td>Ø1,250</td>
</tr>
<tr>
<td>Max. Workpiece dimensions (Additive Manufacturing) mm</td>
<td>Ø600×400</td>
<td>Ø1,250×745</td>
</tr>
<tr>
<td>Max. Workpiece weight (NC swivel/rotary table) kg</td>
<td>600</td>
<td>2,000</td>
</tr>
<tr>
<td>Rotary axis [C-axis] Grad</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>Swivel range [A-axis] Grad</td>
<td>−120 to +120</td>
<td>−120 to +120</td>
</tr>
<tr>
<td>(P_{\text{m}}) under VDI/DGQ 3441 (C-axis/A-axis) Ws</td>
<td>7/9</td>
<td>7/9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milling spindle</th>
<th>LASERTEC 65 3D hybrid</th>
<th>LASERTEC 125 3D hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Speed (standard/optional) rpm</td>
<td>14,000/20,000</td>
<td>14,000/20,000</td>
</tr>
<tr>
<td>Output 40 % DC/100 % DC (standard/optional) kW</td>
<td>19/35</td>
<td>19/35</td>
</tr>
<tr>
<td>Torque 40 % ED (standard/optional) Nm</td>
<td>100/130</td>
<td>100/130</td>
</tr>
<tr>
<td>Tool holder Type</td>
<td>HSK-A63</td>
<td>HSK-A63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laser source</th>
<th>LASERTEC 65 3D hybrid</th>
<th>LASERTEC 125 3D hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibre laser diode Watt</td>
<td>3,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Laser spot diameter 1 (standard) mm</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Laser spot diameter 2 (optional) mm</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Build-up rate (depending on material) kg/h</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Linear axes (X/Y/Z)</th>
<th>LASERTEC 65 3D hybrid</th>
<th>LASERTEC 125 3D hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid traverse speed mm</td>
<td>40/40/40</td>
<td>40/40/40</td>
</tr>
<tr>
<td>Max. acceleration X/Y/Z m/sec²</td>
<td>6/6/6</td>
<td>6/6/6</td>
</tr>
<tr>
<td>(P_{\text{m}}) under VDI/DGQ 3441 mm</td>
<td>0.008</td>
<td>0.008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool change system</th>
<th>LASERTEC 65 3D hybrid</th>
<th>LASERTEC 125 3D hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools Standard/Option Number</td>
<td>30/60</td>
<td>30/60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Machine data</th>
<th>LASERTEC 65 3D hybrid</th>
<th>LASERTEC 125 3D hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width × depth × height (basic machine) mm</td>
<td>4,180×3,487×2,884</td>
<td>5,674×7,625×4,203</td>
</tr>
<tr>
<td>Machine weight kg</td>
<td>13,000</td>
<td>27,000</td>
</tr>
</tbody>
</table>
+ Additionally: Gas bundle argon or central supply by customer
# Technical data

## General
- **Machine weight (standard)**: 31,720 kg
- **Footprint**: 6,690 x 9,390 mm

## Tool spindle (Turret 1)
- **Linear axes X/Y/Z**: Ø 750/ +190 bis –210/1,300 mm
- **Spindle angle [B-axis]**: –30 bis 210°
- **Rapid traverse (tool spindle)**: X: 50; Y: 30; Z: 50 m/min
- **Max. workpiece weight**: 1,700 kg
- **Max. spindle speed**: 12,000 rpm
- **Tool spindle torque (10% DC/cont.)**: 120/44.5 Nm
- **Chuck Type**: Capto C6 [BT 40] [HSK-A63] [CAT40]
- **Tools (optional)**: # 20 (40) (100)
- **Max. tool weight**: 8 (10) kg

## Main spindle 1+2
- **Max. turning diameter**: Ø 660 (tool spindle) > Ø 350 (Turret 2) mm
- **Spindle axis (C-axis)**: 360 min⁻¹
- **Spindle speed/chuck (spindle 1+2)**: 3,000 [10,000]/ JIS A_2-8
- **Spindle motor power (30 min./cont.)**: 30/25 kW
- **Spindle motor torque (30 min./cont.)**: 1,302/1,038 Nm
- **Clamping diameter**: 300 mm

## Turret 2
- **Transversal axes X2/Z2**: 195/1,525 mm
- **Rapid traverse (Turret 2)**: A: 30 X2; Z2: 30 m/min
- **No. of tools (Turret 2)**: 10
- **Max. milling spindle speed (Turret 2)**: 6,000 (optional) rpm
- **Turret 2 milling spindle motor power (5 min./cont.)**: 5.5/3.7 kW

## Powder build-up
- **Material**: Stainless steel / maraging steel / Inconel®625 / 718 / Stellite® / copper / titanium
- **Build-up rate (depending on material)**: 0.8 – 1 [at 3kW] kg/h

## Laser
- **Fibre diode laser, coupled (optional)**: 3,000 [6,000] Watt
- **Focal length (fixed)**: 300 @ Laserspot 1, 158 @ Laserspot 2 mm
- **Laser spot 1**: Ø 4 mm
- **Additive Manufacturing tool change**: Automatic Additive Manufacturing tool changer and turret
- **Laser beam/powder nozzle rotation**: Tangential guide
LASERTEC 4300 3D hybrid

Building space for Additive Manufacturing

LASERTEC 4300 3D hybrid

Floor plan
157 sales and service locations, 14 production factories, as well as 6 Additive Manufacturing Excellence Centres worldwide.