

Production Ready Selective Laser Melting

Optimized for Faster Multi-Laser, Cost-Efficient
Builds for High Volume Projects



SLM[®] 500

Selective Laser Melting Machine

Metal Additive Manufacturing Industrialization

Quad-laser productivity

from the multi-laser technology pioneer

Operational cost efficiency

with automated features

Safe powder handling

keeping material in an inert atmosphere

The highest, safest performance available in its class with cost reduction

The SLM[®]500 is built to ensure operator safety and lower overall operational costs. Material and operator are separated through a closed-loop powder handling strategy that includes an automated powder sieve and supply. Machine downtime is minimized through exchangeable build cylinders to maximize productivity and reduce cost per part. As the first quad-laser metal system on the market, the SLM[®]500 serves as the flagship machine for high volume metal additive manufacturing.

Patented multi-laser overlap strategy for consistent material quality

As the innovation leader in the selective laser melting field, SLM Solutions focuses on both productivity increases and material characteristics. SLM[®] patents include a scan strategy to minimize soot interference with lasers and a laser overlap strategy for efficient processing. Testing proves comparable density and mechanical property results in overlap and single-laser scan areas. The exact laser overlap is altered layer by layer to avoid a visible seam or mechanical weak point in the finished component.

Efficient, Reliable, Repeatable

SLM[®] 500

Selective Laser Melting Machine



Technical Specifications

| | |
|--|--|
| Build Envelope (L x W x H) | 500 x 280 x 365 mm reduced by substrate plate thickness |
| 3D Optics Configuration | Twin (2x 400W or 2x 700W) Quad (4x 400W or 4x 700W) IPG fiber laser |
| Real Build Rate | up to 171 cm ³ /h* |
| Variable Layer Thickness | 20 µm - 90 µm, more available on request |
| Minimum Feature Size | 150 µm |
| Beam Focus Diameter | 80 - 115 µm |
| Maximum Scan Speed | 10 m/s |
| Average Inert Gas Consumption in Process | 16 l/min (Argon) |
| Average Inert Gas Consumption in Purging | 250 l/min (Argon) |
| E-Connection / Power Input | 400 Volt 3NPE, 63 A, 50/60 Hz, 8 - 10 kW |
| Compressed Air Requirement | ISO 8573-1:2010 [1:4:1] 7 bar |
| Machine Dimensions (L x W x H) | 6080 x 2530 x 2620 mm |

*depending on material and build part geometry

Build Chamber Sizes



1 SLM®500 Selective Laser Melting for Serial Production Solutions

The SLM®500 is optimized for top-quality components with a focus on both repeatability and machine uptime. Optimized gas flow through a patented sintered wall prevents soot disruption of the lasers to ensure consistent quality results.

Increased productivity is crucial for production-oriented machines, and the SLM®500 is available with two or four lasers operating independently or in parallel. With 400W and 700W lasers available, users have the choice of laser power matched to their material, with the option of increased power to build in thicker layers for further productivity gains.

2 Permanent Filter Module Improves Machine Uptime and Reduces Costs

The permanent filter module traps process soot in a sintered plate filter that is purged with gas. The waste material is coated with an inhibitor and stored in a bin for dry disposal, while clean gas returns to the process chamber, stabilizing gas flow to ensure part quality throughout long builds without interruption.

The elimination of consumable filter cartridges increases safety while improving machine uptime and reducing costs. Operators no longer need to flood filters and waste management is simplified as controlled diffusion renders a standard dry material for disposal.

3 PSV Closed-Loop Powder Handling Increases Safety and Material Quality

Paired with the Powder Supply Vacuum (PSV), the SLM®500 protects the operator from exposed powder and keeps material under an inert gas atmosphere throughout the powder-handling process.

The PSV features a 90l tank for pre-loading and storage of metal powder. The automatic system sieves material before transportation to the machine for the build process, collects overflow powder to be returned to the sieve during the build, and also connects to the PRS unpacking station for powder removal after completion of a build.

4 Part Removal Station for Efficient Unpacking and Downtime Reduction

The Part Removal Station (PRS) reduces machine downtime by allowing one completed job to be unpacked while the next can begin on the machine. Build cylinders with completed jobs are transported out of the SLM®500 for cooling and powder removal in an inert atmosphere.

Integrated gloves offer full access to remove material without exposing operators to metal powder. A vacuum hose, located directly in the PRS chamber, feeds unused powder directly back to the PSV for sieving and use in the next production build.



Quality Assurance of the Selective Laser Melting Process

Comprehensive monitoring and quality assurance enable a high degree of process documentation and verification. Chamber temperature, oxygen, gas flow and other variables are constantly monitored and logged. This level of process control results in consistent, high quality builds.

Layer Control System (LCS)

Layer Control System (LCS) is a testing and documentation system that examines the performance of each powder layer by monitoring the powder bed and detecting possible coating irregularities.

Melt Pool Monitoring (MPM)

Melt Pool Monitoring (MPM) is an available on-axis tool for visualizing the melt pool in the SLM® process. Data from MPM can be used as a resource for efficiently developing and evaluating the process parameters. In the production of safety-critical parts, the data collected serves as documentation for quality assurance.

Laser Power Monitoring (LPM)

Laser Power Monitoring (LPM) is an available on-axis monitoring system that continuously measures and documents target and actual emitted laser output throughout the production process.

Innovation Comes Standard

SLM Solutions is known as the innovation leader in selective laser melting, being the first to introduce both twin- and quad-laser production systems. Features such as bi-directional powder recoating to reduce manufacturing time, open powder architecture allowing use material from any supplier and full process parameter access for custom development come standard on every selective laser melting machine.

Qualified Material Solutions

SLM Solutions offers expert know-how that drives unique specifications to assure mechanical properties through the combination of machine, parameters and powder audited for composition, quality and flowability. Our material experts are always collaborating with customers to develop and source new alloys optimized for selective laser melting.

Consultative Development and Expert Knowledge-Sharing

SLM Solutions' consulting, applications, training and service teams put customer success first to ensure their return on investment is maximized. Our experts works with customers every step of their additive journey, from application identification and development to factory layout and full serial production ramp-up.



SLM Solutions - Technology Pioneers, Innovation Leaders

SLM Solutions helped invent the laser powder bed fusion process, was the first to offer multi-laser systems and all selective laser melting machines offer patented quality, safety and productivity features. Taking a vested interest in customers' long-term success in metal additive manufacturing, SLM Solutions' experts work with customers at each stage of the process to provide support and knowledge-sharing that elevate use of the technology and ensure customers' return on investment is maximized. Optimal paired with SLM Solutions' software, powder and quality assurance products, the SLM® technology opens new geometric freedoms that can enable lightweight construction, integrate internal cooling channels or decrease time to market.

A publicly traded company, SLM Solutions Group AG focuses exclusively on metal additive manufacturing and is headquartered in Germany with offices in China, France, India, Italy, Russia, Singapore and the United States and a network of global sales partners.



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