

SELECTIVE LASER MELTING

DESCRIPTION OF THE TECHNOLOGY

SELECTIVE LASER MELTING

This technique involves the deposition of a thin layer of dust on a working platform, which is fused with a laser following the specific coordinates derived from the model to be produced. The operation is repeated sequentially for a number of times equal to the number of layers in which the computer designed 3D model is divided. It is a technique suitable for objects that have as a priority the aesthetic quality of the surface, the luminosity of the object and freedom of form.

Selective laser fusion is an additive manufacturing process where, as with all powder bed fusion processes, three-dimensional metal parts are created by the fusion of fine metallic powders together.

In the case of SLM, energy is provided by a high power laser beam, usually ytterbium.

Although the ASTM F42 standard puts it into the "laser sintering" category, it does not seem appropriate to classify it as the SLM process "completely melts" the metal into a homogeneous mass, unlike selective laser sintering (SLS) or direct laser metal sintering (DMLS), which are true sintering processes. A similar process is the previously seen electron beam fusion (EBM), although, as the name implies, it uses an electron beam as an energy source instead of the high power laser. The laser selective fusion process (SLM) is carried out within a chamber containing a strongly controlled atmosphere of inert gas (eg argon or nitrogen with oxygen levels below 500 parts per million). The laser energy is powerful enough to allow complete fusion (welding) of the particles to form the solid metal. The process is repeated layer after layer until the part is completed.

MARKET APPLICATION SECTORS

Auxiliary industry, mouldmakers, automotive, aeronautics, medicine, ...

TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

- Advantages and applications of selective laser fusion: Very useful for producing end pieces with complex geometries and structures with thin walls and hidden hollows or channels. It has a great application in the creation of light parts for the aerospace sector, where the restrictions in the traditional manufacture, as well as the Tooling and Conformal cooling and the physical access to the surfaces for the machining restrict the design of components.

Ability to print without holding structures and production without waste.

CURRENT STATE OF DEVELOPMENT

TRL 5/6

There are commercial materials but still a great way to go in developing new ones.

There are problems arising from the use of media that must also be innovated

INTELLECTUAL PROPERTY RIGHTS

Cada desarrollador de maquinaria tiene sus propios derechos. SLM Solutions GmbH para la maquinaria y materiales

SELECTIVE LASER MELTING

The AIJU SLM®280HL laser metal sintering system provides measurements of 280 x 280 x 365 mm³. The SLM®280HL is equipped with one or two fiber lasers with 3D scanning optics. The system is available in three models, individual media (1x 400 W), dual optics (1x 400 W and 1 x 1000 W) and individual optics (2 x 400 W). Depending on how the components are arranged an accumulation rate of 80% can be achieved.

Build Envelope (L x W x H)	280 x 280 x 365 mm ³ reduced by substrate plate thick
3D Optics Configuration Dual Configuration: with switching unit	Single (1x 400 W), Twin (2x 400 W), Dual (1x 400 W and 1x 1000 W); Single (1x 700 W), Twin (2x 700 W), Dual (1x700 W and 1x 1000 W) IPG fiber laser
Build Rate	up to 55 cm ³ /h
Variable Layer Thickness	20 µm – 75 µm
Min. Feature Size	150 µm
Beam Focus Diameter	80 – 115 µm
Max. Scan Speed	10 m/s
Average Inert Gas Consumption in Process	2,5 l/min (argon)
Average Inert Gas Consumption Purging	70 l /min (argon)
E-Connection / Power Input	400 Volt 3NPE, 32 A, 50/60 Hz, 3,5 – 5,5 kW
CompressedAirRequirement/ Consumption	ISO 8573-1:2010 [1:4:1], 50 l/min @ 6 bar
Dimensions (L x W x H)	3050 mm x 1050 mm x 2850 mm (incl. PSH100)
Weight (incl. / without powder)	approx. 1500 kg / ca. 1300 kg

COLABORATION SOUGHT

Companies interested in the following systems of cooperation:

Applications, developments, new metallic materials, ...

RELATED IMAGES

SELECTIVE LASER MELTING



Image 1:

CONTACT

César Carrón Rosillo (ccarrion@aiju.info)