



STEVEN SEPVEST CORP

INDUSTRIAL LASER SOLUTIONS PROVIDER

Laser Direct Structuring (LDS) Industry

- **Overview**

Over the past decade, mobile communication technology has developed rapidly, especially the much reduced volume and weight of the mobile terminal, which promotes the rapid development of mobile terminal antenna. Facing the request of reducing the size rapidly, while reducing the size, designers should focus to keep the performance of the antenna, such as gain, coverage, frequency band and so on.

In recent years, antenna industry solutions are barely up to today's needs. The main reasons are as follows:

- The traditional mechanical antenna has large volume and high weight, which cannot meet the tiny communications equipment appearance.
- The costs and cycle of flexible circuit board manufacturing are too long to meet the needs of the fast-growing market.
- Low quality of the signals received is another key issue.

In recent years, market requirement is propelling the development of technology. Laser Direct Structuring (LDS) is put into effort. It is the major directions of its development in the future. As all kinds of targets reach optimization, it has become the ultimate direction. However, the high cost has become the major inhibitor of development.

- **Our Solution**

As the laser industry leader, HGLASER launches the laser equipment, which can match with antenna industry and save customers money with the help of each technical strength, laser devices and working table.

Laser-Direct-Structuring (short for LDS)

Principle: Laser is emitted by laser device and travels through fiber into Laser Focus Adjustment Optical System. Reflected by scanning system, it will enter the focusing system and then focus on the working surface. By adjusting the Laser Focus Adjustment Optical System, laser focus can change the position in 1, 2, 3. Through the adjustment system, it is able to change in the x, y plane. So as to achieve the movement of laser in three-dimensional space and the processing in three dimension.



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One of the most important advantages by using laser to process materials is that the rapid scanning and the structure of the circuit design, unconstrained by geometry, make the delivery time of producers shorter and easier.

The specific techniques are as follows:

Injection Molding

Use thermoplastic as raw material and process by one-component injection molding. Compared with two-component injection molding, it just needs a set of mold and will be easier and faster.

The plastic material uses the plastic that could be activated by laser as raw materials. Some properties of the raw material provided by electronic components suppliers should be taken into consideration. Such as processability, application temperature, flame-retardant level, mechanical and electrical properties, Injection properties, electroplating properties and cost.

Laser activation

Only doped with a kind of special additives in these thermoplastics, can LDS technique be activated by laser. When laser projects the plastic components, physical and chemical reactions will take place at the shallow surface of the thermoplastics to form a activated metal particle, which serves as reducing agent to catalyze the deposition of copper in electroless copper plating. In the process of laser molding, besides activation, it also has micro processing at the shallow surface of the thermoplastics to create micro rough surface and embed the metallized copper favorably.

Metallic coating

The purpose of metallization is to deposit metal at the place of laser projecting and form the electrically conductive structure. LDS technique deposits copper by adopting the electroless plating method. Before plating, clean the components, deposit 5-8um copper on the circuits in the chemical copper plating tank. Finally, deposit by chemical nickel-plating and gold plating. It can also use Sn, Ag, Pd/Au, OSP as coating.

Encapsulation

There are some plastic materials with high thermal stability that are suit for LDS laser activation, such as LCP, PA6/6T or PBT/PET blend. All these plastics can resist reflow soldering and are compatible with standard SMT process. Fluid dispensing is often adopted to coat solder paste on bonding pads because of different solder height. Now, the SMT technology suitable for 3D has been mature.

In recent years, the rapid development and high stability of new technology make the 3C industry manufacturers



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transform overall. In the meantime, the profit margins drops rapidly affected by the expensive imported equipment.

The launching of our equipment has attracted wide customers, reduced two thirds of the cost and improved the customer's profits.

	Impact molding (metal sheet)	FPC antennae	LDS antennae
Design Speed	2.5 days	2.5 days	3 days
Design Change Cycles	7-10 days	4-5 days	2 days
Mold Fee	High	Medium	Low
Corner Radius	0.8mm	0.5mm	0.1mm

Reference table between HGLASER HG-3D20w and counterparts			
Item	HGLASER	Counterparts	Advantages
Processing Length	300mm	140mm	Has long antenna processing advantage to suit the rapidly growing needs of PAD and NB
Processing Efficiency	1-1.15	1	Compared with similar products, processing efficiency increases 10%-15%
Processing Accuracy	±0.025mm	±0.025mm	/
Processing Stability	/	CPK=1.36	Good processing stability
Equipment Price	Less than 1.5 million	About 3 million	Cost come down by half
Maintenance Charge	Low	High	50% lower than competitors

• Customer Benefit

With laser technology, customers will benefit much:

- Without tool wear, the operating and material costs are reduced;
- Fast working speed and shorter change cycle improve production efficiency greatly;
- Shorter delivery time and lower maintenance costs



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- Reduce costs and improve profits;
 - High processing stability and easy operation;
 - Customers can use at any time according to their needs, no need to stock.
 - With the traceability system, all aspects of the whole manufacturing process and the operating costs can be controlled effectively;
 - Customers can scan all kinds of circuit design structures, not limited by the shape, which leads to processing diversification.
- **Related Application**

