

REVIEW OF LASER PLASTIC WELDING PROCESS

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ABSTRACT

Laser plastic welding requires one part to be transmissive to a laser beam and either the other part absorptive or a coating at the interface to be absorptive to the beam. The two parts are put under pressure while the laser beam moves along the joining line. The beam passes through the first part and is absorbed by the other one or the coating to generate enough heat to soften the interface creating a permanent weld. Semiconductor diode lasers are typically used in plastic welding. Wavelengths in the range of 808 nm to 980 nm can be used to join various plastic material combinations. Power levels from less than 1W to 100W are needed depending on the materials, thickness and desired process speed. Diode laser systems have the following advantages in joining of plastic materials:

- Cleaner than adhesive bonding
- No micro-nozzles to get clogged
- No liquid or fumes to affect surface finish
- No consumables
- Higher throughput
- Can access work-piece in challenging geometry

Requirements for high strength joints include:

- Adequate transmission through upper layer
- Absorption by lower layer
- Material compatibility – wetting
- Good joint design – clamping pressure, joint area
- Lower power density

KEYWORDS: Laser Plastic Welding, Optically Transparent, Laser Absorbent Layer