



- 1 Soldered beam shaping optics for high power lasers.
- 2 Solderjet bond head in assembly environment.
- 3 Fiber coupler with aspheric lens in front of a laser diode.

SOLDERJET BUMPING FOR THE ASSEMBLY OF MICRO-OPTICAL SYSTEMS

Motivation

The integration of optical, electronical and mechanical components on smart system platforms allows for the further miniaturization of complex, multifunctional and hybrid system assemblies. Laser based solderjet bumping is an innovative bonding technique to meet higher requirements compared to polymeric adhesives in terms of:

- mechanical strength,
- long term stability,
- thermal cycling and humidity reliability,
- radiation resistance and
- compatibility with vacuum.

The solder ball bumper integrates solder sphere feeding, reflow and placement of the solder bump as well as providing a localized inert nitrogen atmosphere in one singular and flexible to use device. Thus a high degree of automation and the capability of 3D-packaging is realized.

Advantages

- localized and time-restricted input of thermal energy
- contact free heating and application of solder within an inert N₂ atmosphere
- precisely defined volume of solder alloy
- mechanical, electrical and thermal contacting in one assembly step
- flux free processing
- joint component accuracy < 0.5 μm

Applications

Assembly of complex, hybrid and miniaturized optical and micro-mechanical systems, such as:

- collimation and beam shaping optics for high power fibers and diode lasers,
- miniaturized optical instrumentation,
- joining of micro-optical components and MEMS/MOEMS devices.

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