



GLASS FRIT BONDING – A PROCESS FOR MICRO AND MACRO APPLICATIONS

Task

The laser-based glass frit bonding now represents a serious alternative to conventional joining techniques when temperature-sensitive electronic components need to be encapsulated. That it is suitable for industrial use has been demonstrated by hermetically sealed components in the field of microsensors. Their typical housing geometries range from a few square millimeters to several square centimeters. In this new process, the bond is formed within a few seconds as the energy is introduced into the joining zone to a spatially limited extent by a quasi-simultaneous irradiation strategy. The laser beam is guided repeatedly over the soldered contour at very high speeds with the aid of a scanner system (~ 1000 mm/s), which however limits component size. Since the process offers great benefits for large-area applications, further development of the process technology for macro applications is required.

Method

Applying this process to large components is possible by replacing the quasi-simultaneous strategy with a serial irradiation strategy. In the so-called contour soldering process, the laser beam is moved continuously over the joining zone. The bond forms continuously in series in the region of the glass solder contour, which the laser beam passes. The component size is not limited by this type of process strategy; depending on the material and application, feed speeds of 15 mm/s can currently be achieved.

Result

Different irradiation strategies enable laser-based glass frit bonding to be used both for micro and for macro applications. Matched to the joining task, the irradiation strategy generates a homogeneous, crack-free bond.

Applications

Possible applications include the closure of microsensors and microactuators as well as the encapsulation of OLEDs and displays. Also, this laser-based process could be used to generate the edge seal of vacuum-insulated glazing.

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- 3 Contour soldered soda-lime glass plate (dimensions: 340 x 340 mm²).
- 4 Examples of the quasi-simultaneous laser-based glass frit bonding of different materials (dimensions: 10 - 80 mm²).