



## LASER IMPULSE METAL BONDING

### Task

Conventional integrated circuit packaging faces a particular challenge: raising the working temperature and the increasing conductor cross-section area in the field of power electronics. The novel joining process Laser Impulse Metal Bonding (LIMBO) was developed to connect large-area power connectors with thermally sensitive components (e.g. batteries, circuit boards, ceramic substrates).

### Method

The LIMBO process thermally separates the joining partners by means of a gap, through which the high energy input required to melt the connector can be introduced without the lower component being exposed to the high temperatures. In order to produce a cohesive connection between the two joining partners, the molten bath is deflected and the lower joining partner wetted and bonded. Thanks to an evaporation process at the melt surface, temporal focus modulation is used for this deflection.

### Results

The LIMBO process can generate a connection – stable at high temperature – within a total process time of less than 100 ms; the connection has an aspect ratio of welding depth to connection cross-section of up to 1:45. The thermal substrate load is kept low by an energy input time in the deflection and connection phase of less than 5 ms.

### Applications

These properties make LIMBO a new contacting solution for, among others, circuit boards, ceramic substrates with metallization (e.g. DCBs, DABs) and hybrid components (e.g. MIDs). In addition to joining thermally sensitive substrates, the process can be applied to cohesively join metallic components with high gap tolerances.

The »LIMBO« project has been financially supported by the Fraunhofer-Gesellschaft.

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1 Cross-section of a weld of copper  
on PCB metallization.