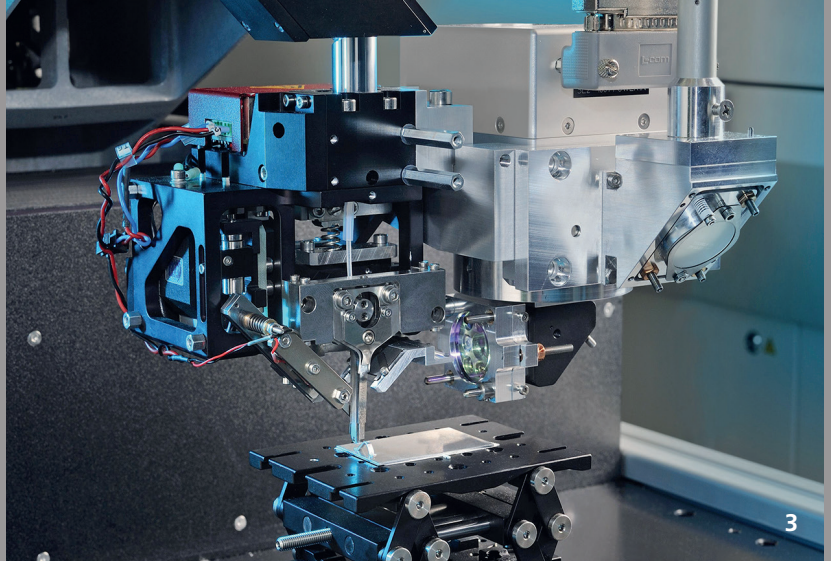

LASER BONDING OF ALUMINUM CONTACTS FOR BATTERY TECHNOLOGY

Task

Contacting battery packs in the automotive industry faces a challenge – the high demands from structural loads. Vibrations occurring during operation, large temperature fluctuations and mechanical stresses can impair the performance and the service life of the battery pack. An electrically and mechanically robust connection process is required for meeting the requirements; for this purpose, Fraunhofer ILT has developed a laser welding method that can join aluminum ribbons to the battery poles of prismatic battery cells.

Method

For the connection technology, a Laserbonder developed at Fraunhofer ILT is used in which a modified wire bonder is equipped with a fiber laser, a galvanometric scanner and a beam guiding and focusing unit. The system technology allows an automatic feed of a flexible connector to the component surface. Using spatial power modulation, the system can weld an aluminum ribbon having a cross-section of 300 x 2,000 µm^2 to an aluminum alloy, representing the battery pole of the prismatic cell. The mechanical robustness of this compound has been tested by means of shear tests and metallographic analysis.

Results

The laser bonding allows adjustment of the bond width in the range of 300 to 450 µm and a mechanical shear strength of up to 40 N per bond. The method approach demonstrated here can be applied to all prismatic and cylindrical battery cells. In particular, the process is characterized by its ability to create the connections quickly, robustly and flexibly without needing specific component preparation, thereby contacting the individual cells to make modules or packs.

Applications

The Laserbonder can be used in wide ranges of power electronics and battery technology. Laser bonding can be applied especially where fast and flexible contacting solutions are required.

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3 Bonding head of the Laserbonder.
4 Laser-bonded aluminum strips on aluminum contact.