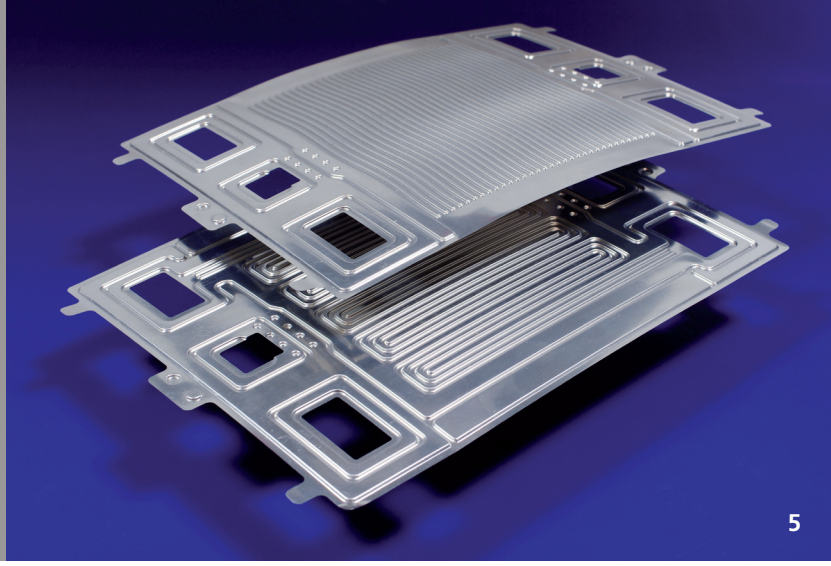

WELDING OF BIPOLAR PLATES

Task

The use of renewable energy sources in the form of hydrogen or methanol can help to reduce environmental pollution and increase efficiency in energy production. An example of this is the direct methanol fuel cell. Its advantages in comparison to common batteries and H_2 fuel cells are significantly longer distances at comparable system volumes. To increase the efficiency of the fuel cell even further, flow field geometries adapted to the process media (e.g. as bipolar plates) may be used. The setup as bipolar plates makes a joining and assembly technique for the build-up in stacks necessary. For the market to accept these technologies, however, joining times need to be low and dense welding seams need to be highly reproducible.

Method

To fulfill these requirements, laser welding offers the optimum prerequisites. The use of task-specific clamping devices and the adjustment of the welding parameters for different materials are key tasks in this context. For this purpose, an adapted chuck has been developed and the welding of bipolar plates with a size of about 190 x 140 mm (thickness 2 x 0,1 mm) has been carried out with a fiber laser.

Result

The welding of bipolar plates with fiber lasers can be achieved in a period of less than 20 seconds per plate pair, so that a series in production scale is possible. Process errors can be reduced by improvements in the clamping device as well as integration of protective gas and adjusted process parameters.

Applications

The use of laser welded bipolar plates with increased efficiency allows higher ranges in the mobility sector. In addition the knowledge gained regarding the clamping and process technology can be applied to other comparable joining tasks, like joining micro fluidic components or design elements.

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3 Cross section of the generated seam.
4 Top view of a weld seam.
5 Different flow field geometries of the bipolar plates.

Subject to alterations in specifications and other technical information. 06/2013.