



HIGH SPEED CUTTING OF SLOT ARRAYS IN THE SUBMILLIMETER RANGE

Task

Laser radiation should be used to cut large arrays of slots into a 250 μm thick stainless steel foil with a prescribed kerf geometry and high surface rates. The process is intended to enable slot geometry and kerf widths to be adjustable in the sub-millimeter range. Also required are consistently high cutting quality and dimensional stability over the entire array surface. In addition to these high quality requirements, the process should also achieve high perforation rates of about 100,000 holes/min.

Method

A fiber laser having a high brilliance is used as a laser beam source. The high processing rate requires the kerf to be generated at cutting speeds of at least 40 m/min. The desired form of the kerf is immediately given by the selected process parameters in an on-the-fly process. The physical effects of the high-speed cutting process, in which melt flow has a significant influence upon kerf formation, as well as a modulation of the laser power were used to selectively form the kerf. To ensure a consistent cut quality and contour accuracy, parameter sets are selected that ensure the process is stable.

Result

Slot arrays with high cut quality have been created with cutting speeds of over 100 m/min. It could be shown that the dimensions of the holes can be adjusted within broad limits in the sub-millimeter range.

Applications

This technology can be applied in industrial segments that require micro and aerodynamically optimized structures with a high density and high quality of drilled holes.

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2 Slot array with a gap
width of 110 microns.