



## »SCANPLEX« – A SCANNER ARRAY FOR PARALLEL LASER MATERIAL PROCESSING

### Task

Research is currently investigating various approaches to increase productivity in laser material processing. For example, Fraunhofer ILT is pursuing a multi-laser approach for applications where productivity cannot be increased because higher laser power imposes process limitations. An increase in the number of laser beam sources used makes it possible to raise the process speed almost proportionally to this number. For this a scanner system is required, which is capable of precisely and quickly guiding the individual beams – independently of each other – over the processing field. For a multi-laser approach, conventional galvanometer scanners are severely limited in terms of the laser beams that can be used per area since they need such a large installation space.

### Method

In order to significantly increase the power of independent multi-beam processing, Fraunhofer ILT has developed the »Scanplex« scanner array, which combines four 2D deflection units for parallel laser material processing in a housing of the size of a conventional 2D processing head. The scan head is based on the mini-scanner technology developed at Fraunhofer ILT, which combines a small construction volume with a large aperture. The use of compact F-theta lenses makes it possible to process an area of 120 x 120 mm<sup>2</sup> in parallel with four separate laser beams.

### Results

A demonstrator of the scanner array with 2 x 2 2D deflection units was set up in the laboratory and is currently in the characterization phase. Microstructuring with a green laser was used to demonstrate the potential of this scanner technology. Specifications of the scanner array are as follows:

|                                |                                |
|--------------------------------|--------------------------------|
| Construction volume, l x w x h | 140 x 140 x 90 mm <sup>3</sup> |
| Focal length f                 | 160 mm                         |
| Scan field size A              | 120 x 120 mm <sup>2</sup>      |
| Scanning speed v <sub>s</sub>  | ≤ 8 m/s                        |
| Aperture D                     | 7 mm                           |
| Irradiance E                   | ≤ 500 W/cm <sup>2</sup>        |
| Interface                      | XY2-100                        |

### Applications

- Laser marking and engraving
- Additive manufacturing
- Micromachining
- Laser cleaning

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3 »Scanplex« 2x2 scanner array.

4 2D mini scanner.