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Embossing dies for surface functionalization by laser micro structuring

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The functionalization of surfaces and layers is a key technology of the 21st century. It is paving the way for the transformation of photonics into highly integrated components. In this way, traditional materials get new or improved features and new materials are developed for a resource-efficient industrial use and an increased efficiency. Virtually any structure can be written in a direct manner by only one correspondingly precise control of the laser beam. This approach is particularly well-suited to produce a so-called master which can then be used for the parallel mass reproduction of the structure, as for example for embossing plates or rollers. This second duplication step is an established process, as a disadvantage of direct laser writing is its genuine serial character, i.e., the focused laser beam is sequentially moved over all those regions of a surface where material should be removed. Embossing dies processed by ultra-short pulsed lasers are already used in some fields to transfer microstructures directly into a metal surface. One major advantage of micro structuring by ultra-short pulsed lasers is the melt-free ablation of steel surfaces of three dimensional micro structures within one step. The combination of ultra-short pulsed laser and high-precision machinery and the handling of high resolution digital file formats has been realized in the cylinder micro processing system DIGILAS for embossing dies. This contribution shows state-of-the-art structures and future possibilities of this new technology.

Biography

Stephan Bruening is Member of the Executive Board of Schepers and responsible for R&D projects and security customer projects. He graduated in Münster and Hagen, holds an MSc degree in Photonics. During his PhD studies at the RWTH-Aachen, he worked in the area 3D-micro-structuring of metallic surfaces. In 2012, he was the winner of the Innovation Award Laser Technology of the AKL and ELI. Beside the continuous further development of the DIGILAS micro processing equipment, for e.g. intaglio printing, micro embossing, he is the R&D Manager for publicly funded projects by the BMBF, such as MICROPHOT, PIKOFILAT and currently MULTISURF.

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