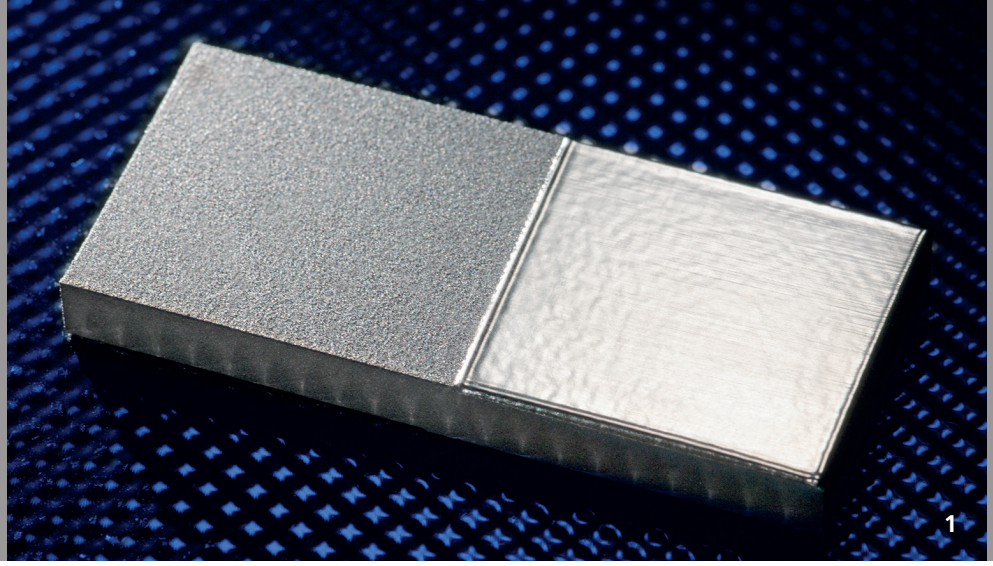

LASER MICROPOLISHING OF ADDITIVELY MANUFACTURED METAL COMPONENTS

Task

Additively manufactured metal components are gaining more and more importance in industrial production since they offer many advantages. A disadvantage, however, is their surface quality: It is insufficient for many applications, making a reworking of the functional surfaces necessary.

Laser polishing can, however, provide a possible solution to this issue. So far, the polishing of additively manufactured metallic surfaces has been developed with continuous laser radiation. Although a significant reduction in the roughness has been achieved, there is a high heat input into the work piece so that a risk of distortion remains (especially in the case of small work pieces or lightweight structures). For this reason, Fraunhofer ILT is investigating laser micropolishing with pulsed laser radiation since the heat input in this process variant is significantly lower.

Method

To adapt the laser micro polishing process to the material and the surface, the institute determined how different process parameters influenced the surface roughness. The process parameters were adjusted successively.

Results

The surface roughness of a work piece made of TiAl6V4 by laser powder bed fusion (LPBF) was reduced, for example, with laser micro polishing from Ra = 11.7 µm to Ra = 0.9 µm. There is no distortion of the work piece and the processing time is only 5.3 s/cm².

Applications

The result can be transferred to a variety of other materials, such as steels or nickel-based alloys. In addition, the process is not limited to additively manufactured components, but can also be applied to differently produced surfaces (e.g. Metal Injection Molding MIM, EDM).

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1 Selectively laser-micropolished surface.

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