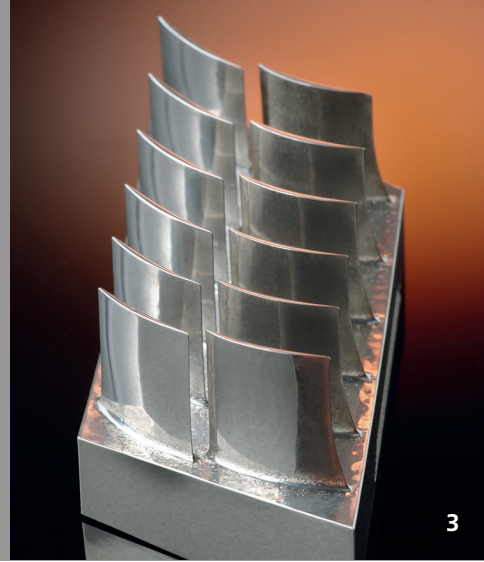# POST-PROCESSING OF SLM-MANUFACTURED COMPONENTS

Task

Since it has a large amount of geometric freedom, the additive manufacturing process Selective Laser Melting (SLM) has great potential for use in the production of small to medium lot sizes for the turbomachinery sector. The characteristic high surface roughness ($R_a \geq 5$ µm) of SLM-manufactured components, however, is a limiting factor. So that the advantages of the process can be used in the turbomachinery industry, SLM must be combined with appropriate post-processing methods to meet the requirement of surface roughness ($\leq R_a$ 0.8 µm) and form accuracy. Therefore, the task is now to identify potential post-processing methods and to examine these in combination with SLM in terms of surface roughness and form accuracy.

Method

The first step consists in identifying potential processes for post-processing surfaces generated with SLM and hard to reach. In a second step, SLM shall be used to manufacture blade-shaped sample bodies. These were processed with the identified post-processing method. Before and after each post-processing, the sample body is measured and recorded. This way, by means of the company Alicona's »InfiniteFocus« device, based on focus-variation technology, both the input and the output roughness are determined; in addition, the ablation between the detected input and output geometry is compared by means of the company GOM's »ATOS Compact Scan 5M« device, based on light projection technology.

Result

The following post-processing methods – vibratory finishing, abrasive flow machining, plasma polishing and micro machining – were studied. All processes investigated reduce input roughness of about $R_a \approx 10$ µm to at least $R_a \leq 4$ µm. The smallest roughness, $R_a = 0.1$ ...0.3 µm, was achieved with the micro machining process. Here, a local ablation of 40 ± 20 µm was identified.

Applications

The current research on the subject of post-processing SLM-manufactured components addresses the turbomachinery sector, but can be extended to other sectors of mass production (e.g. the automotive industry).

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2 False color image comparing measured input and output geometry during plasma polishing.
3 Post-processed guide vane cluster by means of micro machining.

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