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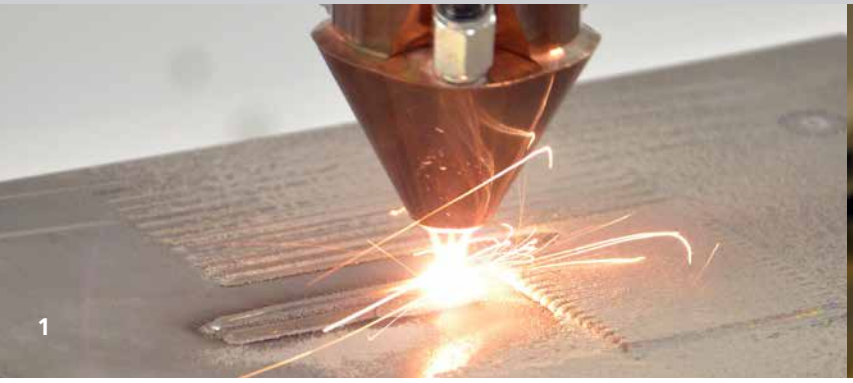
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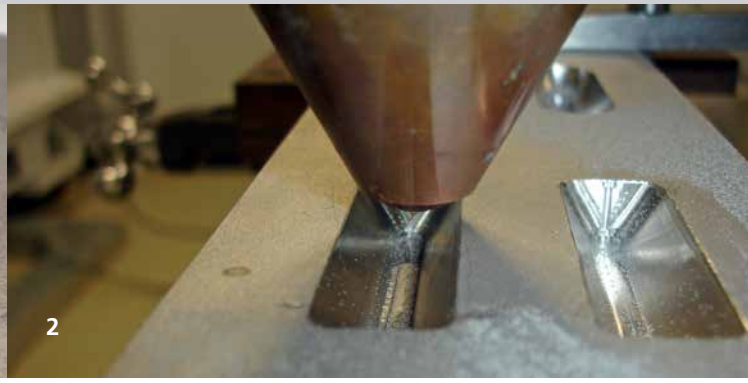
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1 *The coating process in laser powder cladding*
2 *Filling grooves for repair purposes*

LASER POWDER CLADDING

The march of technological progress means that components must be made increasingly resistant to high temperatures, corrosion and abrasive wear. Laser powder cladding is a technique that addresses these problems and offers a wide range of solutions.

Resilient coatings can be applied specifically to prolong the service lives of components and tools. What's more, it's also possible to use cladding materials to repair damaged parts or worn surfaces. Not only is the component repaired in such a way every bit as good as a factory fresh one, it can even be better, if the repair materials selected offer enhanced qualities.

Finally, additive manufacturing offers a further field of application whereby moulds and tools can be modified and tailored to meet on-going development requirements.

Laser powder cladding is a process in which a powder filler material is welded to a given component. A laser beam melts a thin area of the component's surface, while at the same time the powder filler is injected into the melt pool. Once solidified the filler material forms a metallurgically bonded layer on the component's surface. In comparison to conventional techniques, laser powder cladding is notable for the following characteristics:

- Minimal heat affected zone and distortion
- High precision cladding
- Excellent reproducibility
- Broad spectrum of combinable base and filler materials

Modern mould and tool-making processes in the automobile, aviation and energy generation industries derive particular benefits from these key advantages.

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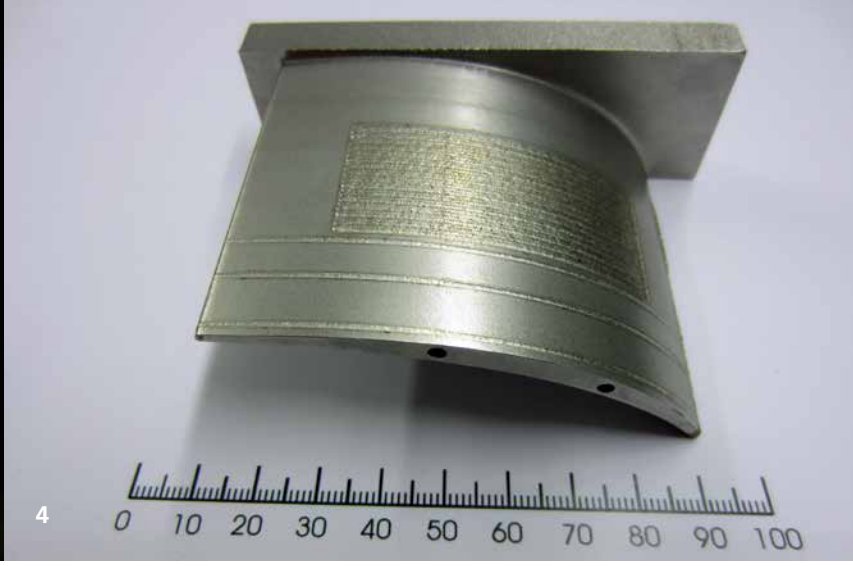

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Our expertise

Research on laser powder cladding is conducted with a state-of-the-art laser system which enables precise processing of even the most filigree parts and also offers a laser cell that can accommodate large components of up to two meters in length. Flexible positioning with a tilting rotary table means that even complex three dimensional surfaces can be machined.

We are skilled in the use of a wide range of materials from steels and hard materials to nickel-based alloys and lightweight construction materials like titanium. Fraunhofer IPK covers the whole laser powder cladding process chain from preparatory measures such as cleaning and separating to eventual post-processing stages such as milling or polishing. To ensure that the development of the technique never loses sight of real-world conditions, we take a holistic view of laser powder cladding, always placing it within the context of the overall process chain.

Our services

We offer our customers a broad and needs-oriented range of services in the three fields of wear protection, repairs and modification. These include development and testing of novel powder filler materials and the adaption of wear-resistant layers to specific forms of stress.

Our service range begins with consultancy and feasibility studies and covers all subsequent stages through to implementation of laser powder cladding in the existing manufacturing chain. Working in close collaboration with the customer, we ground project goals on a solid scientific foundation and drive development all the way to operability.

We advise our customers about the various ways in which laser powder cladding can be used in their companies, inform them of the resultant benefits, and evaluate the economic applicability of the technique.

Your benefits

Our research and development services aim to assure the cost-effective use of laser powder cladding. Repairing components with this technique is an innovative and environmentally friendly alternative to direct replacement of parts. The high automation potential displayed by the technique can eliminate the need for many manual welding operations. Coated components with longer service life offer qualitative advantages on competitive markets. Rapid modification of existing parts, tools and prototypes seeks to save valuable time and offers an answer to ever shorter development cycles. The close bonds between basic research and applied research at Fraunhofer IPK assure you the very best solutions for your individual applications.

3 *Repairing compressor blades*
4 *Layer structure after cladding*