



**Fraunhofer**  
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FRAUNHOFER INSTITUTE FOR PRODUCTION TECHNOLOGY IPT

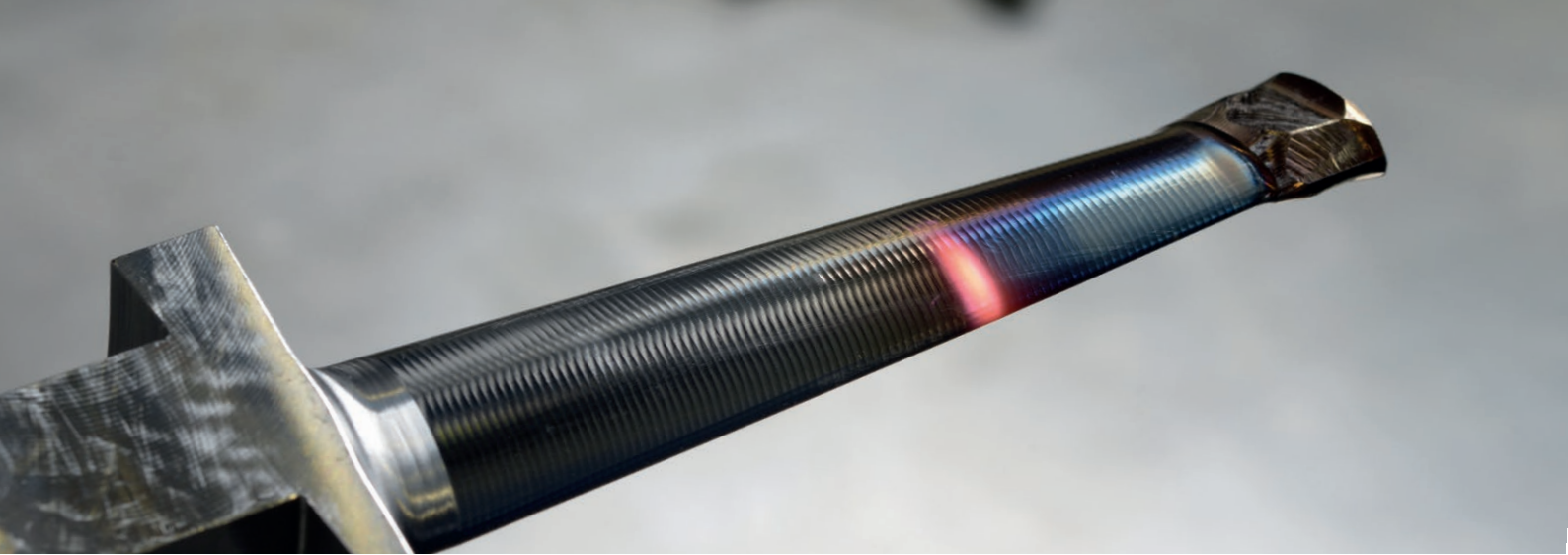
# **LASER-BASED MATERIAL MODIFICATION – LOCAL WEAR PROTECTION OF COMPLEX COMPONENTS**



Our partner



**RWTH**AACHEN  
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# LOCAL MATERIAL MODIFICATION OF COMPONENT SURFACES

Surfaces of tools and dies are often subject to high levels of wear. In order to retain component function, surfaces can be functionalized to suit the subsequent use. Various surface treatment techniques can prolong tool life and improve component, tool or die performance. The aim here is not only to select a suitable material and the right kind of heat treatment for the component but also to find the right surface treatment technique.

The flexibility of laser technology and its ability to process near-net shapes present a whole range of solutions: laser hardening, alloying, dispersing or wire-based laser metal deposition can be used to modify a surface in order to reduce wear. These processes can be adjusted, supported by specifically developed CAx modules, for use with 5-axis machining systems. Even complex part geometries, whose surfaces are exposed to high levels of thermal and mechanical load can be adapted to suit any specific area of application.

Critical areas of tools and dies can be hardfaced by applying additional layers of a hard-wearing material to increase the wear resistance and thus achieve longer lifetimes. This further delays the need for repairs.

## Advantages of modifying component surfaces

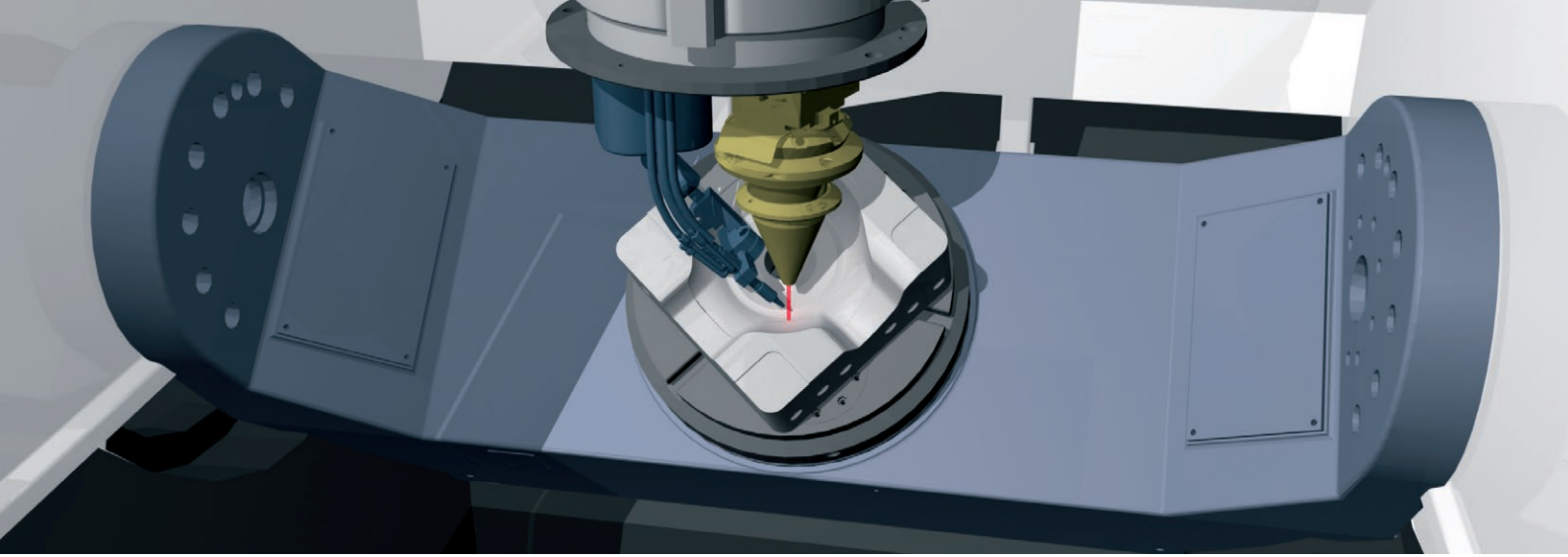
- Significantly longer tool life
- Flexible modification of surfaces to suit the collective loads
- Flexible process control
- Specific local wear protection
- Minimized introduction of heat into component

## Our specialties

- Design of the process to suit specific applications
- Automated 5-axis process controls for dealing with complex components
- Comprehensive technical expertise in process design, laser processes and machining strategies
- Use and development of cutting edge CAx technologies for product design, process design and simulation as well as NC data generation

## Our offer

- Quick and flexible treatment of complex components via CAM interfaces
- Independent advice that takes your individual needs into consideration
- Feasibility and profitability studies
- Production of small and medium-sized series



# INTEGRATED SOFTWARE SOLUTION FOR LASER-BASED MATERIAL MODIFICATION

Even the best technology will not survive in the market if it is not user-friendly in practice. Fraunhofer IPT has developed integrated software for material modification that is easy to use: the CAx modules integrate all the available knowledge about the laser processes. These modules bring the whole planning process for each laser process together – from the detection of component geometry and process simulation to the generation of NC code for the machining system. Highly modern equipment is used to perform the automated 5-axis component machining processes.

## Advantages of CAx-aided process design

- No special knowledge about laser technology is required for NC programming as the system is based on an extensive technology database.
- "Laser tools" provide analogies to milling programs, making it easier to understand the process.

## Our specialties

- Intuitive software operation via an operator-friendly graphical user interface with minimal training required
- Linked to a process and technology database
- Processing data provided in common NC formats, e.g. Heidenhain iTNC, Sinumerik 840D, ISO-NC, Siemens PLM Software CLS, CATIA APT and in other dialects
- Seamless integration of the software module into existing software systems such as Siemens NX

## Our offer

- Development of software for processing complex tool geometries with different laser surface treatment technologies
- Support during on-site software implementation
- Software training and workshops

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