

APPLICATION CENTER LASER STRUCTURING FOR TOOL AND MOLD CONSTRUCTION



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Fraunhofer Institute for Laser Technology ILT

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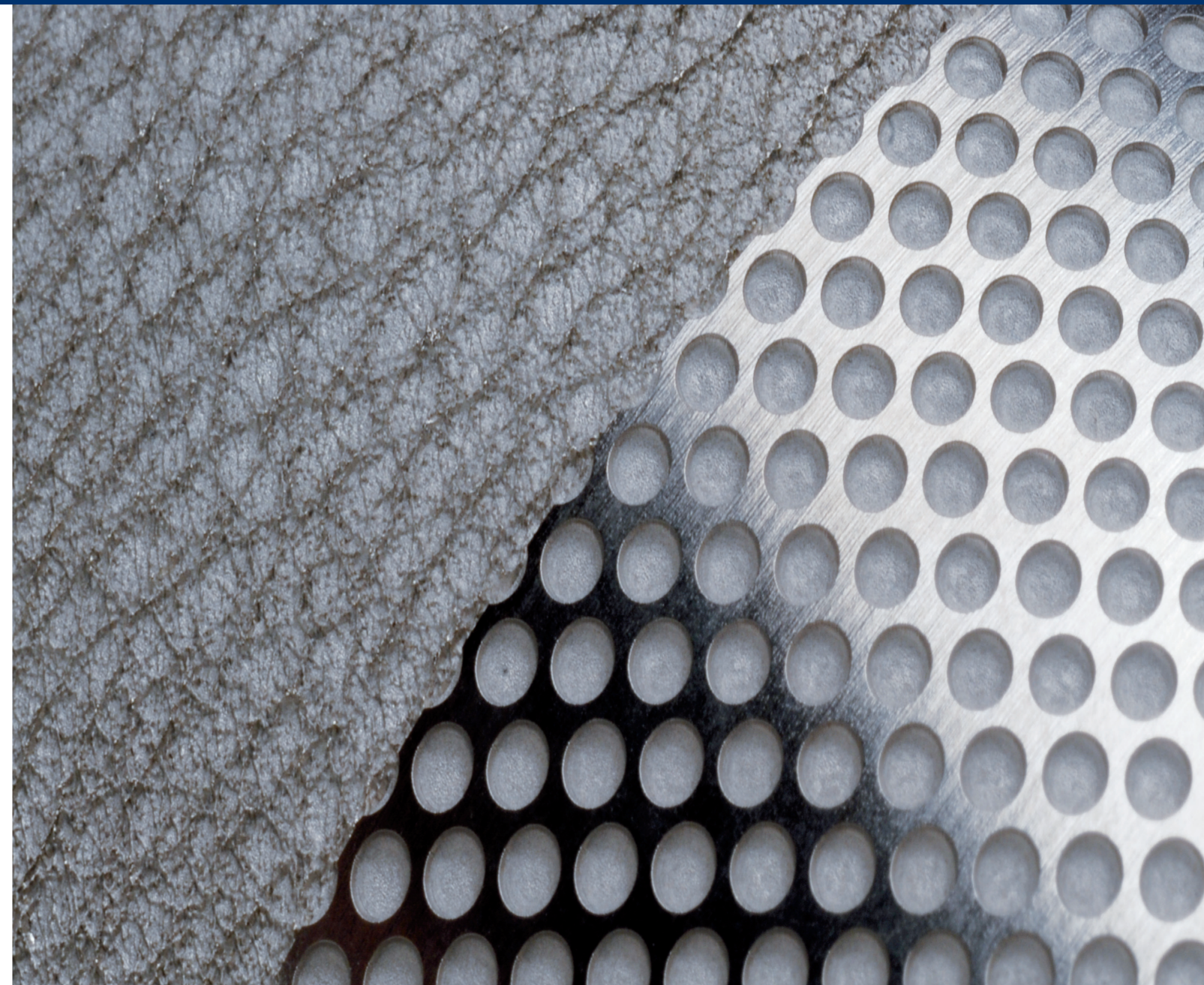
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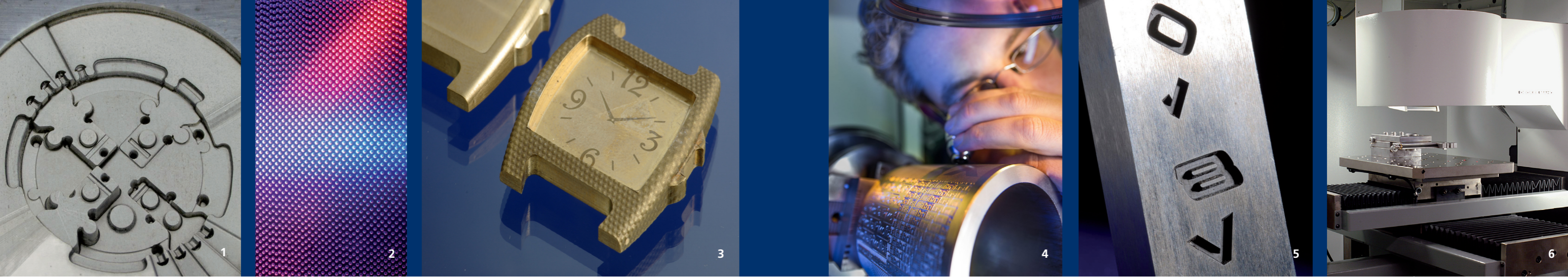
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Fraunhofer Institute for Laser Technology ILT

The Fraunhofer Institute for Laser Technology ILT is one of the most important development and contract research institutes in laser development and application worldwide. Its activities encompass a wide range of areas such as developing new laser beam sources and components, laser-based metrology, testing technology and industrial laser processes. This includes laser cutting, ablation, drilling, welding and soldering as well as surface treatment, micro processing and additive manufacturing. Furthermore, Fraunhofer ILT develops photonic components and beam sources for quantum technology.

Overall, Fraunhofer ILT is active in the fields of laser plant technology, digitalization, process monitoring and control, simulation and modeling, AI in laser technology and in the entire system technology. We offer feasibility studies, process qualification and laser integration in customized manufacturing lines. The institute focuses on research and development for industrial and societal challenges in the areas of health, safety, communication, production, mobility, energy and environment. Fraunhofer ILT is integrated into the Fraunhofer-Gesellschaft.





LASER STRUCTURING FOR TOOL AND MOLD CONSTRUCTION

Using laser radiation to ablate material for the purpose of shaping and structuring tools and molds has become an established process with a wide range of uses. At the Fraunhofer Institute for Laser Technology ILT, experts are continuously improving the quality of surface results through the use of ultrashort laser pulses (USP). The melt-free structuring of ultra-hard materials is a main focus of our work.

In the application center for laser structuring, we develop and evaluate new laser technologies for the production of tools and functional structures. Where conventional manufacturing techniques such as milling and EDM come up against their commercial or technological limits, laser processing offers productive solutions with structural resolutions in the micrometer range and accuracies in the nanometer range. From feasibility tests to small batch production, we accompany you on your road to using this innovative tool. Components for prototypes or small-scale series can also be produced cost-effectively in multiple parts panels.

Applications

- Light guide structures in forming tools
- Finely roughened (black) surfaces on steel for high contrast in injection-molded parts (barcodes and matrix codes)
- Structuring, cutting and drilling ceramics
- Design structures on freeform surfaces
- High-speed drilling of thin films
- High-precision drilling with adapted cone

Machinery

Fraunhofer ILT's inventory of ultrafast pulsed lasers and laser machines is the only one of its kind in Europe. For special tasks for which there is no existing solution, we build special optics and handling systems, such as immersion optics for the internal structuring of cylinders to minimize friction.

USP machinery at a glance

- DMG Sauer »Lasertec50« with Trumpf »Trumicro5050«
 - 5-Axis-Machine with 3-Axis-Galvoscanner
 - Lasers with 6 ps, 50 W and 1030 nm
- DMG Sauer »Lasertec40« with »Timebandwidth Duetto«
 - 3-Axis-Machine with 3-Axis-Galvoscanner
 - Lasers with < 12 ps, 15 W and 1064 nm
- Kugler »Microgantry« with Coherent »Hyperrapid«
 - 3-Axis-Machine with 2-Axis-Galvoscanner
 - Lasers with < 10 ps, 50 W, 1064 nm, 20 W, 532 nm, 8 W and 355 nm

- Kugler »Microgantry« with Coherent »Hyperrapid«
 - 4-Axis-Machine with 2-Axis-Galvoscanner
 - Lasers with < 10 ps, 50 W 1064 nm, 20 W, 532 nm 8 W and 355 nm
- Self-built drilling optics with Trumpf »Trumicro5270«
 - 3-Self-built drilling optics helical drilling optics
 - Lasers with 6 ps, 60 W and 515 nm
- Roll-to-Roll-Machine with Lightconversion »Pharos«
 - Special machine with 2-Axis-Scanner
 - Lasers with < 200 fs, 12 W 1030 nm, 514 nm and 343 nm
- GAS-Automation with SPI G4 fiber laser
 - 3-Axis Cantilever System with 2-Axis-Galvoscanner
 - Lasers with 8 - 250 ns, 70 W and 1060 nm
- ZK EDM machine converted for Synova water jet head with Edgewave ns-Laser
 - 3-Axis-Machine with water-jet-guided laser beam
 - Lasers with 9 ns, 20 W and 532 nm
- Aerotech with Amphos high-power Laser
 - 5-Axis-Machine with 3-Axis-Galvoscanner
 - Lasers with < 1ps, 400 W and 1064 nm

Measuring Equipment

- Video microscopes »Keyence VHX500« and »VHX2000«
- Laser scanning microscope »Keyence VK9700«
- White light interference microscope
- Scanning electron microscope

Range of Services

Following your specifications, we create tools and tool inserts with micro- and nano-structures in all common tool materials, such as through-hardened tool steel. Based on CAD data (IGES, STEP, etc.), we transform your design ideas into real tools and surfaces.

Should unknown properties of a material or the demand for special geometries prevent us from manufacturing a tool directly, we can use special processes we have developed to determine the relevant manufacturing parameters. Together with external partners specialized in tool and plastics technology, we can also model the entire process chain of a productive manufacturing operation for you.

Send us a non-binding request for a quote and we will draw up a detailed offer. If you approve, we will carry out the work in a development and manufacturing environment certified to ISO 9001/2008.

We look forward to hearing from you!

Contact

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- 1 Injection mold, Ø 30 mm.
2 Light conductor made of PMMA with molded micro lenses.
3 Demonstrator for the freeform texturing of mold surfaces.

- 4 Tool inspection in the machine setup.
5 Mold insert from steel with depth engravings (rework-free).
6 3-Axis-Machine for laser structuring.