HAILTEC

MICROPROCESSING WITH ULTRASHORT PULSE LASER

You can rely on us:
From application to delivery

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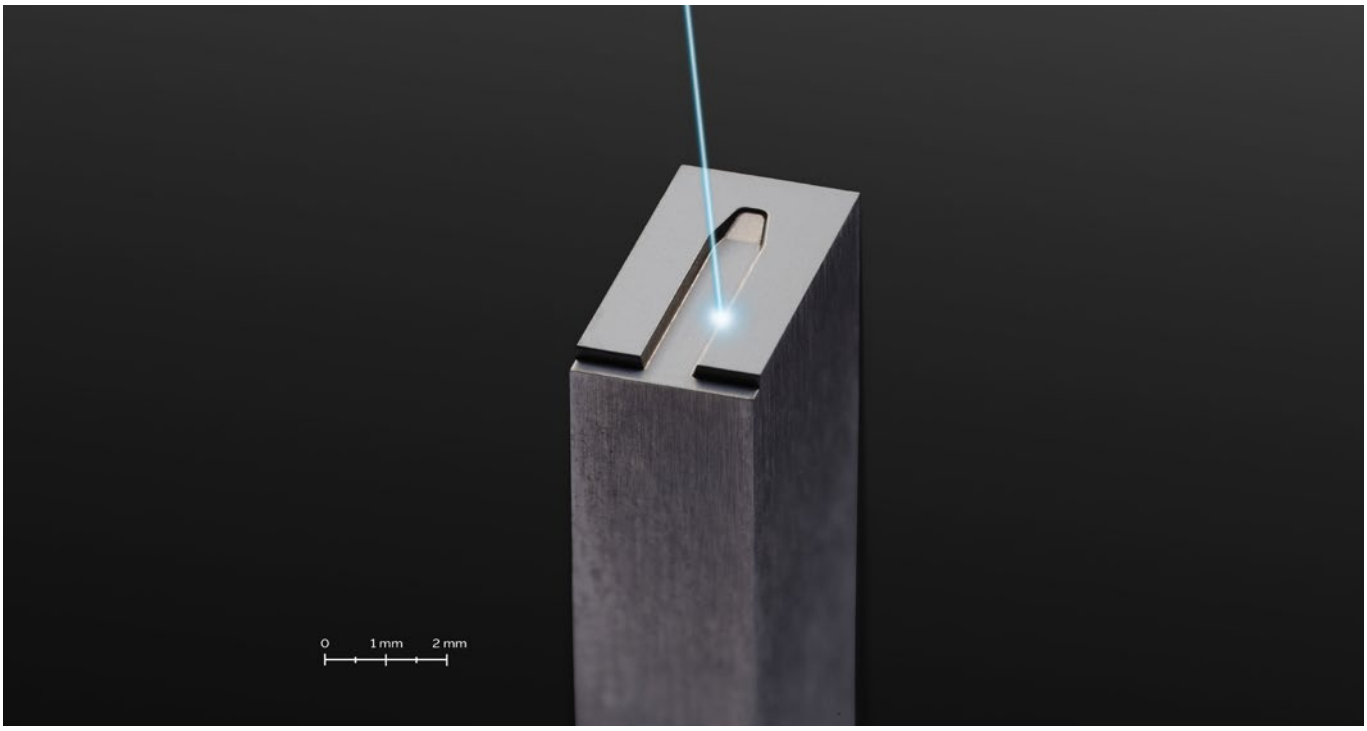
HAILTEC

FROM IDEA TO MARKET-READY PRODUCT

As your high-tech service provider, we develop applications and manufacture them from prototype to series production. For this, we use automated ultrashort pulse laser systems (USP) from DMG Mori and TRUMPF – partners with whom we have been advancing the industrial application of this groundbreaking technology for years. With us, you use USP technology smartly and quickly: 3D data in, finished part out. We verify the micron-precise results with AI-supported measurement technology from Bruker Alicona. When will you test us?

The key advantages of working with us:

+ You receive reproducible, fast, and economical components
+ You benefit from complete material freedom
+ You save tooling costs and avoid wear
+ You use high-tech without having to invest yourself



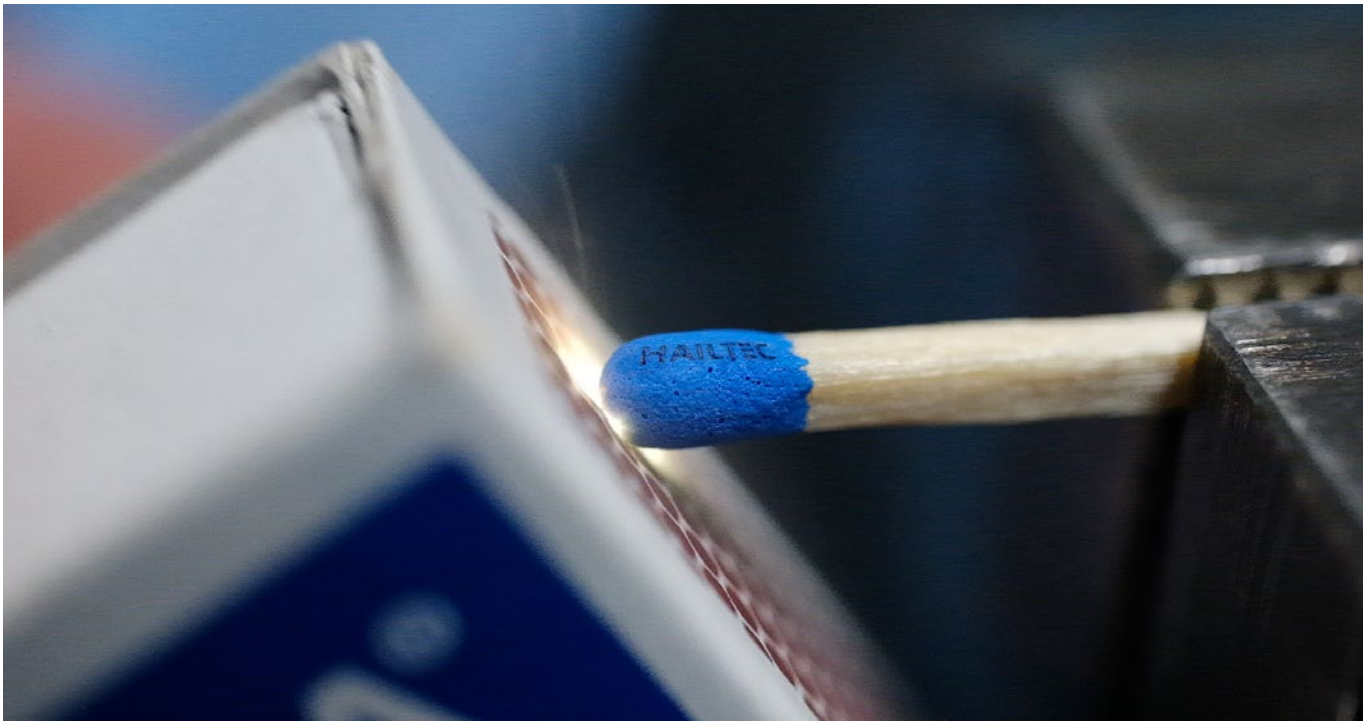
OVERVIEW

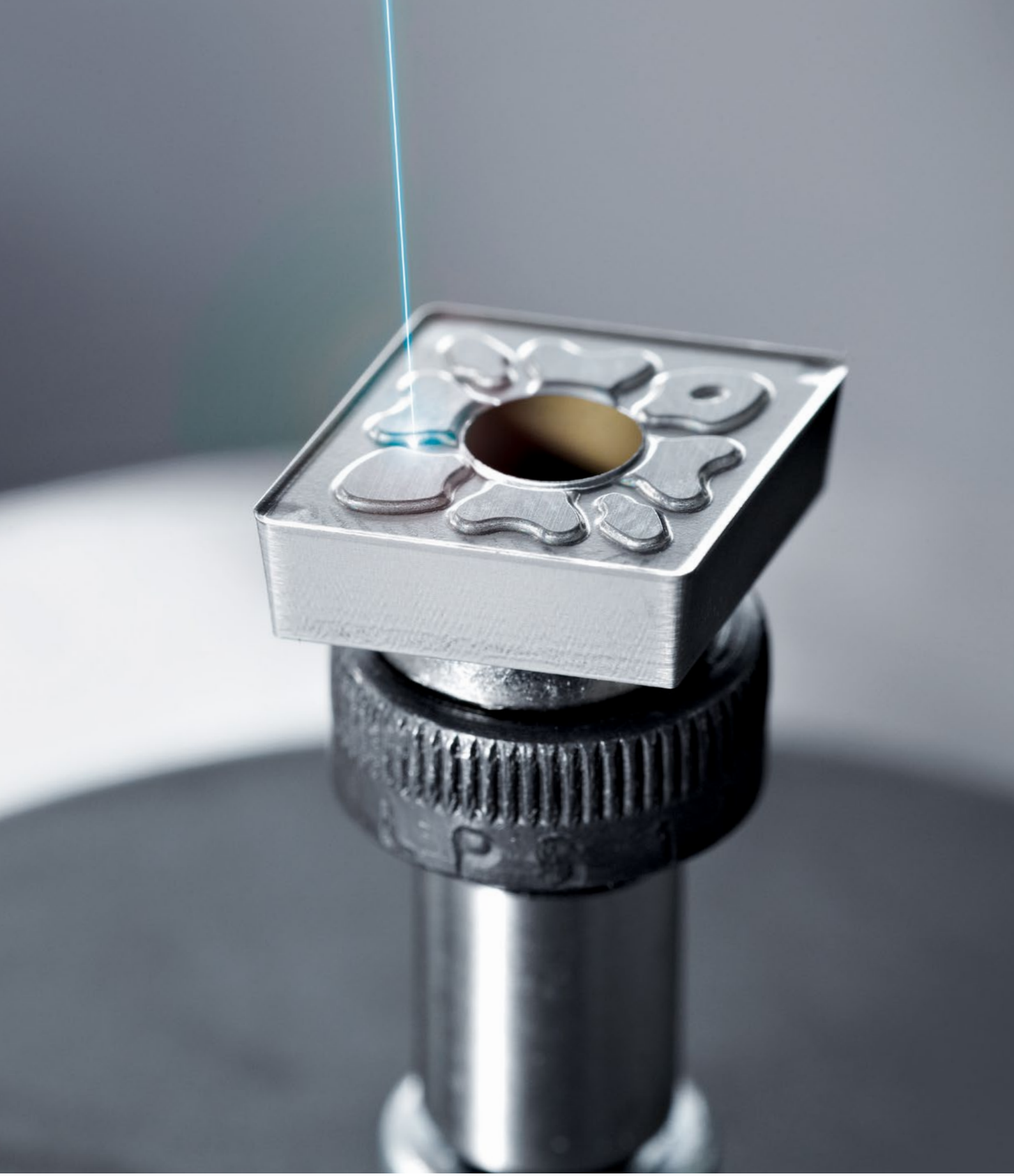
HAMMER? LIGHTNING!
The UKP Process explained simply

Composite materials like carbide consist of hard particles and a tough binder metal. Traditional methods such as grinding or electrical discharge machining (EDM) remove these particles like a hammer. This causes particles to break out of the binder, creating defective, often sharp-edged areas in the material.

In contrast, the ultrashort pulse laser (USP) hits the material very briefly, like a flash of lightning. It can vaporize or halve entire particles. The result is homogeneous, controlled edges – without rework. The flash does not wear out and leaves the remaining hard particles undisturbed. The finer the grain size, the better the flash works. It operates very quickly with minimal material wear, making it cost-effective even for large stamps.

Up to 10x Longer Tool Life for Stamping Dies and Chip Breakers – How does it Work? We have published a **whitepaper** which describes series of experiments conducted with Ceratizit Empfingen and explains the background.





HAILTEC›s Partners in Ultrashort Pulse Laser Processing

CERATIZIT GROUP

DMG MORI

Bruker alicona

TRUMPF

LASER ABLATION

With femtosecond laser ablation, we create precisely laser-cut 3D shapes for you, such as:

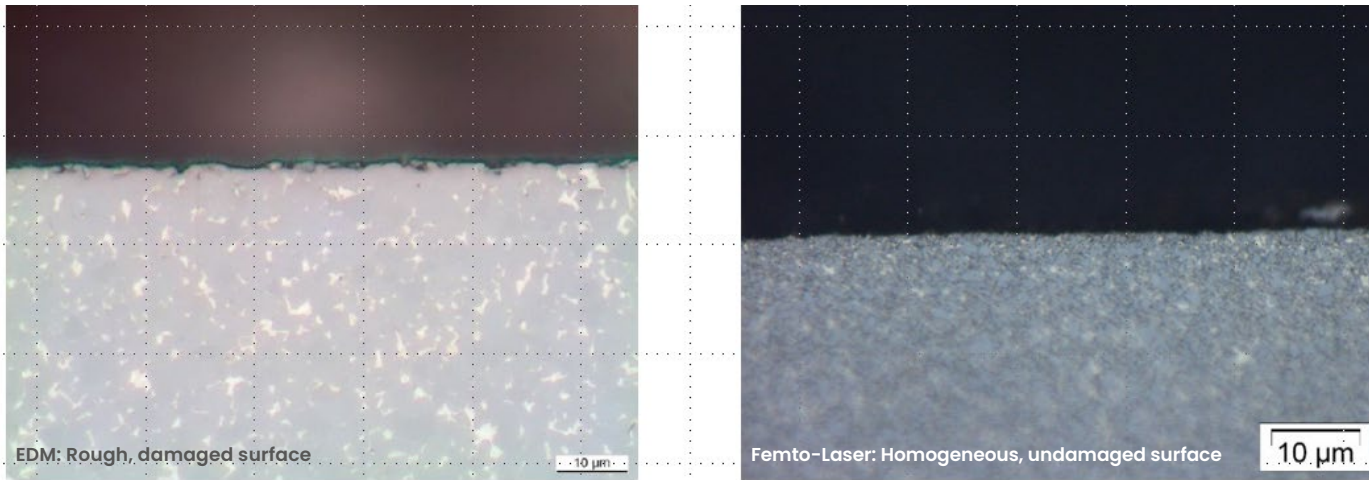
– Stamping dies and press molds for progressive stamping tools
– Letter and number embossers for product marking
– 3D shapes like chip breakers made of carbide or PCD
– Delicate cavities in components and blanks
– Laser deep engravings
– Microfluidics

You benefit from the minimal heat input of the USP laser: distortion-free, melt-free, low-stress, and without affecting the microstructure.
The result: precise contours with optimal surface quality.

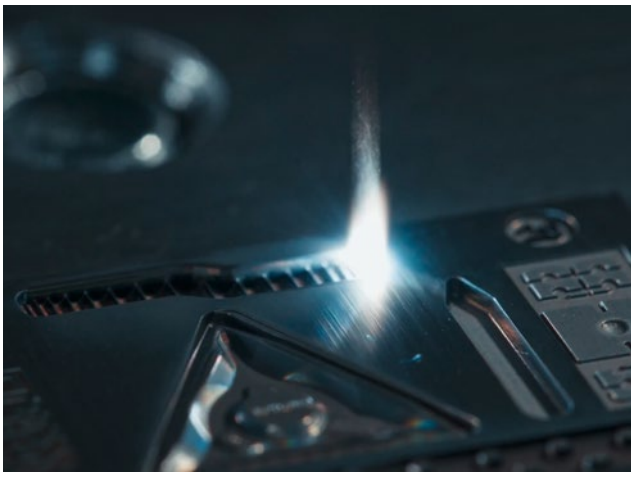
GOOD TO KNOW:

- **Surface Quality:** In carbide up to Ra 0.1 µm
- **Tool Life:** Up to 10x longer
- **Time Savings:** No electrode manufacturing or tool production
- **Reproducibility:** The laser works with repeatable precision in fine-grinding quality
- **Material Variety:** Tool steel, powder metallurgy steel, carbide, ceramic, or even plastic

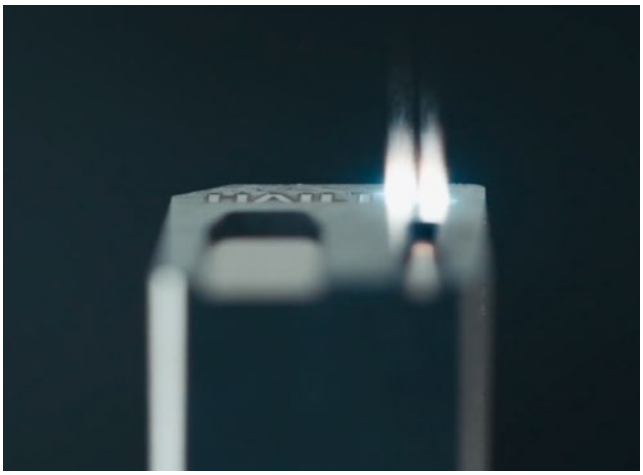
Surface Quality Comparison: EDM vs. Femtosecond Laser (Source: Ceratizit Empfingen GmbH)



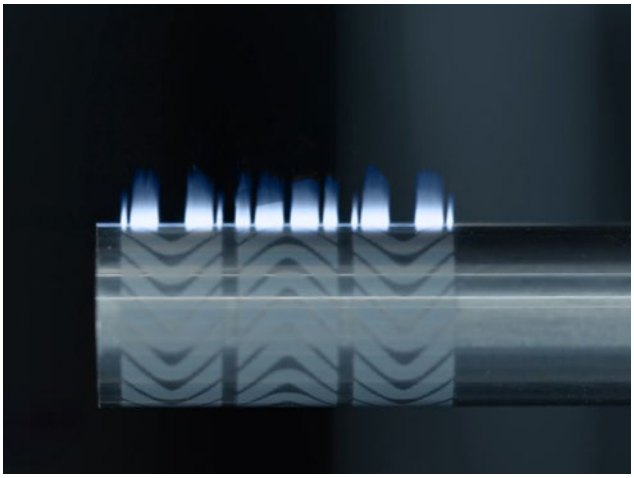
A series of experiments conducted by Ceratizit Empfingen and HAILTEC shows that the USP laser achieves significantly finer surface qualities of up to Ra 0.1 µm, without the need for rework.



Micro-Precise Laser Ablation of Carbide and Ceramic



Classic Stamping Die



Thin-Film Laser Ablation of Ceramics and Carbides

Chip Breaker Steps and Chip Breakers, for example, as an insert made of PCD

SURFACE FUNCTIONALIZATION:

USP laser processing enables precise three-dimensional structuring of thin film systems. A typical example: micro-precise isolation trenches in metallized surfaces on dielectric substrates – a key technology for electronic and sensor applications. Thanks to optimized laser parameters, we only remove the metal layer, leaving the underlying substrate undamaged.

Typical industries: Embossing and stamping technology, electronics

» Since we started using USP laser processing, the service life of our embossing stamps has multiplied. For HAILTEC as a manufacturer, this means fewer repeat orders, but it is precisely this quality and honesty that we appreciate in the collaboration. «

Thomas Weber
Head of Toolmaking

MICROSTRUCTURING

With five axes and femtosecond laser beams, the USP laser achieves tool inserts and the finest 3D surfaces on your components, including:

– Tribological structures
– Optical and haptic textures
– Functional surface structures, e.g., lotus effect

The ultrafast pulses and “cold” material removal without heat input into the material surpass etching technology or nanolaser in terms of time and quality by a multiple.

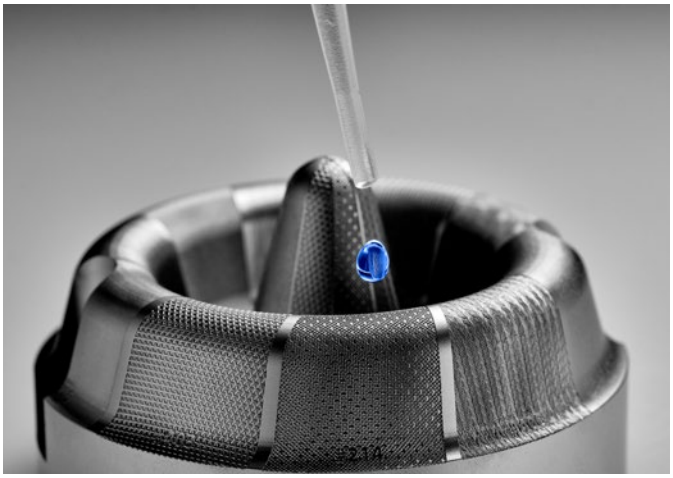
Typical industries: Tool and mold making, watch and jewelry industry

GOOD TO KNOW:

– **High surface quality**
– **No slag, minimal rework**
– **Ultra-fine resolutions**
– **Absolutely precise and repeatable**
– **Components in finish quality**

MICROSTRUCTURING OPTIMIZES TRIBOLOGY SYSTEMS

Friction, wear, and sealing of sliding rings in pumps and bearings can be specifically improved. Especially for automotive applications with strict environmental regulations, USP laser technology offers decisive advantages: The highly precise surface functionalization is possible with almost all materials.



Microstructured 3D Shape “Sombrero”

QR code injected into plastic, scannable with a smartphone

MICROCUTTING

Miniaturized components are gaining importance in many industries. With the ultrashort pulse microcutting process, we manufacture shapes and geometries for you on a contract basis:

- **In films and sheets from 10 to 500 µm thickness**
- **Without heat-affected zone (HAZ) even in brittle-hard material**
- **With web widths in the µm range**

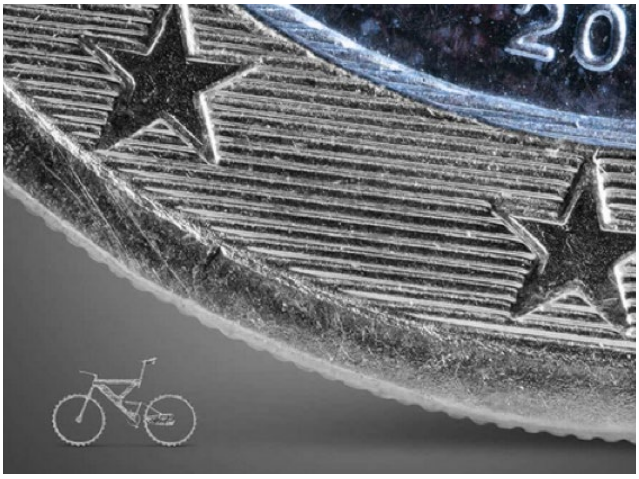
Microcutting with the USP laser is ideal for components such as spring elements, watch hands, precision bores, micro-saws, etc.

Typical industries: Electronics, automotive, medical technology, watch and jewelry industry

GOOD TO KNOW:

- **Cutting tolerances of up to ± 5 µm**
- **Finest cuts with spot diameter < 20 µm**
- **Burr-free and rework-free edges**
- **Nearly right-angled cut edges**
- **More economical than wire EDM**

Precision mechanical components such as micro-gears for the watch industry



The mini mountain bike next to the 2-euro coin illustrates the possibilities of the technology (Source: TRUMPF)

BLACK MARKING

With ultrashort pulse technology, we mark your components with corrosion-resistant markings such as:

– UDI and Data Matrix codes
– Serial and article numbers
– Delicate graphics

The markings remain clearly visible even after countless cleaning and passivation cycles.

Typical industries: Medical technology

GOOD TO KNOW:

– Permanently readable, deep black, stable from all viewing angles
– Gentle on materials, as there is no heat input
– UDI-compliant according to MDR
– HAILTEC is certified according to ISO 13485
– Cleaned and cleanroom packaged upon request

The USP laser marks UDI (Unique Device Identification) according to the EU Medical Device Regulation (MDR)

MEASUREMENT TECHNOLOGY AND AUTOMATION

Advanced USP laser systems paired with digital, validated processes guarantee consistent quality at HAILTEC. Important components for this are:

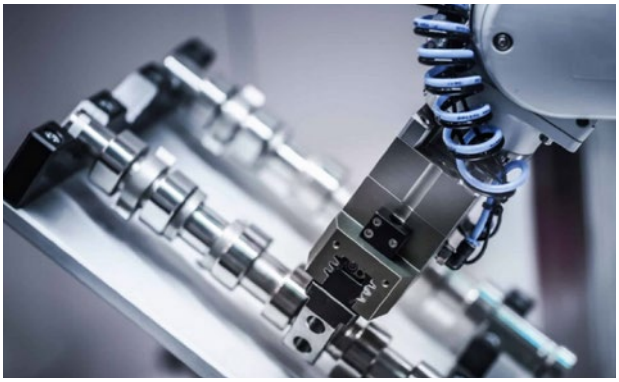
– AI-supported measurement technology from Bruker Alicona

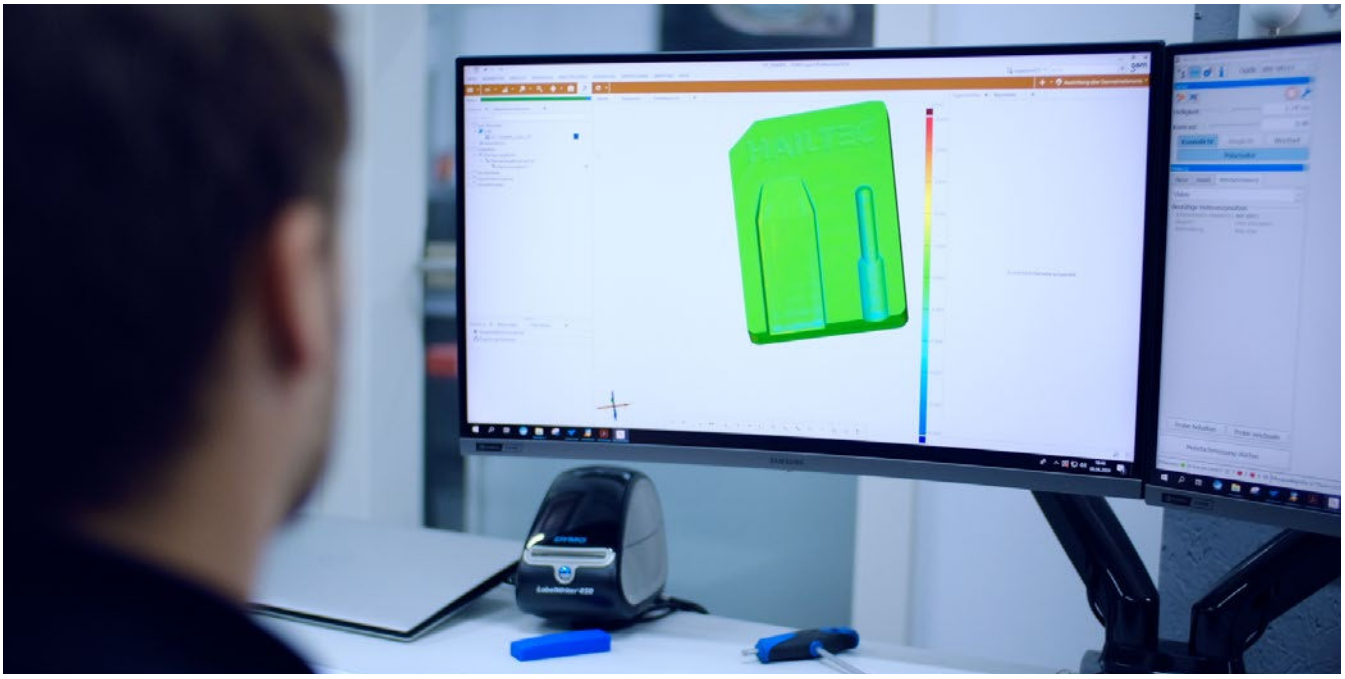
– Product-accompanying measurements and in-house measurement laboratory

– Automated production

From application development to series production, we support you quickly and economically. We demonstrate the quality in real-time with µm precision, for example, surface qualities up to Ra 0.1 µm.

3D measurement of an embossing stamp with AI-supported measurement technology: The CAD deviation can be displayed with false colors or target-actual comparison.





Flexible production capacities thanks to automation: If needed, we run additional autonomous shifts with robots.

WE TRANSFORM METAL TO TRANSFORM THE WORLD

At HAILTEC, we create small parts with a big impact. With our technological „Lego kit," we support customers in various industries, from automotive to toolmaking.
As **pioneers in application**, we have been advancing the industrialization of ultra-short pulse laser processing since 2018, together with laser source manufacturer TRUMPF and equipment manufacturer DMG MORI.

For future industries that require the finest components, we are bold enablers. Clients appreciate us as a capable, tech-savvy, and reliable team. Following the motto "Anything but ordinary," we deliver precision mechanical components from hard metal as well as aerospace parts from molybdenum as a **development partner** and contract manufacturer.

This is in our DNA:

- Precise
- Courageous
- Inventive
- Honest

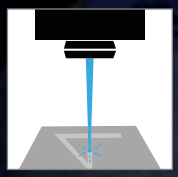
COWS OUT, LASERS IN
From Farm to High-Tech Hub

"Cow out, laser in" is the micro-version of our origin story. Starting in 1998, Wilfried Hailfinger built what has since become HAILTEC, converting a former cow barn into a laser manufacturing facility that continues to grow. A farm as a high-tech farm: We develop and manufacture small, precise components in the Swabian Alb from quantities of 1 to 500,000. And if the job is urgent, we'll „get the cow off the ice" for you – that is what we say in German for getting challenging jobs done.

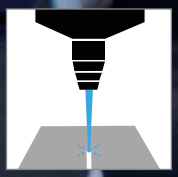
Working with us means you can fully focus on developing and marketing your products, with a local contact always available. Our service covers the entire process—from raw materials to manufacturing precision mechanical components, right through to ready-to-install parts, optionally packaged under cleanroom conditions. We believe in **fair play and stand for high-tech solutions plus trust**.

HAILTEC

TECHNOLOGY PARK FOR FOR INDUSTRY



Ultra-Short Pulse Laser Processing



Laser Fine Cutting

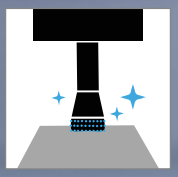
Micro Water Jet Cutting

CNC Precision Manufacturing

Precision Forming Technology

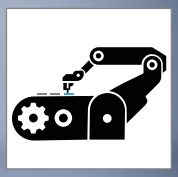
Cleaning and Cleanroom

Metrology



Finishing (Surface Finish)

Toolmaking and Construction



Automated Production Systems

INDUSTRY SOLUTIONS FOR:

E-Mobility
Medical Technology
Space / Aerospace
Mechanical Engineering
Electronics Industry
Embossing and Stamping Technology
Jewelry and Watch Industry
Defence

DO YOU ALREADY HAVE YOUR HAILTEC SAMPLE BOX?

We know how difficult it is to be convinced by just images and words when it comes to high-precision components. That's why we offer you a special service: Order our exclusive sample box for free. After all, seeing and feeling are the best ways to be convinced of the quality and craftsmanship of our products.

+ Selected examples of components for e-mobility.

+ Detailed information on the manufacturing processes and their benefits.

+ Contact details for personal consultation and next steps.

» If you request a sample part from HAILTEC today, you'll likely be working with us ten years from now. Because as a tech-crazy team, we have so much fun doing what we do that you'll see it in the results. «

Alexander Renz
CEO

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Here's how it works:
Scan the QR code and order your personal sample box on our website.

UKP EN 001

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