



HiLASE Centre

From Discovery to Impact

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The Cornerstone: Deep Tech Expertise in Lasers

- **High-average-power DPSSLs**
- Advanced **thermo-optical modeling**, robust thermal management
- Design, prototyping, and **operation experiences** with state-of-the-art laser systems
- Unique **LIDT/LSP/LMM** infrastructure
- **Engineering and technical capabilities** - smart & secure laser control system development and integration



Why We Exist – And Where We’re Going...

Vision 2035

To become the globally recognized leader shaping the future of high-power laser applications, **transforming industries**, and **expanding impact beyond Earth**.

Mission

To boldly push the frontiers of laser technology—translating innovation into **real-world solutions** that fuel **economic growth** and **technological leadership**.

Purpose

We believe in transforming cutting-edge laser technologies into **real-world impact**.

Key Focus Areas



Advanced Laser Manufacturing

For biotech, energy, semiconductors, and mobility — enabling precision processing, material enhancement.



Space-born Laser Technologies

Secure communication, in-orbit laser applications, asteroid mining.



Defense & Security

Directed energy systems, laser-based protection, materials enhancement.



Laser Training Centre

A global hub for laser safety and skills development.

Cooperation with Czech Industry



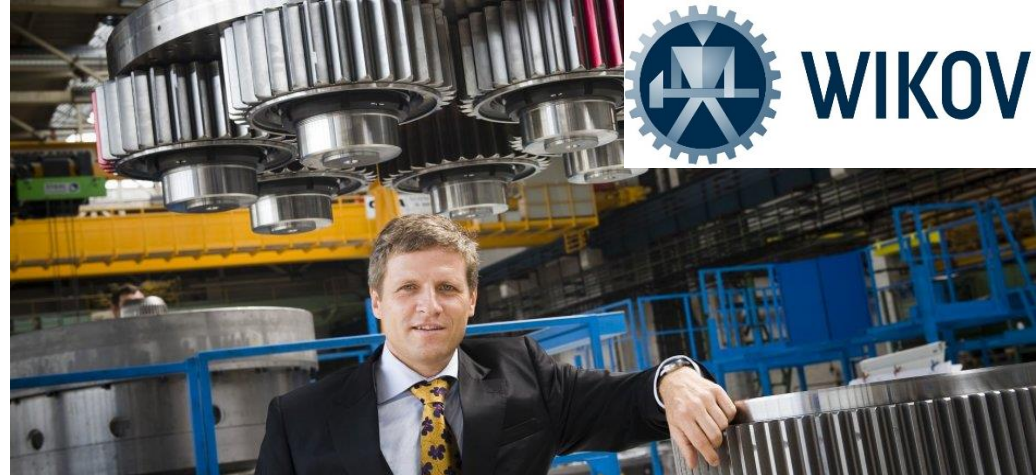
IQS
GROUP



ŠKODA



WIKOV



**LASER
THERM**

LASERY PRO PRŮMYŠLOVÉ TECHNOLOGIE



CEZ GROUP



SHM

SUPER HARD MATERIALS



SIGMA



HiLASE joined the F-35 Industrial Cooperation Program



HiLASE Laser Family



BIVOJ



KAZI



PERLA©



ESTER

BIVOJ: World-record Superlaser



105 J / 10 Hz / 10 ns @ 1030 nm (2016)

145 J / 10 Hz / 10 ns @ 1030 nm (2021)

95 J / 10 Hz / 10 ns @ 515 nm (2022)

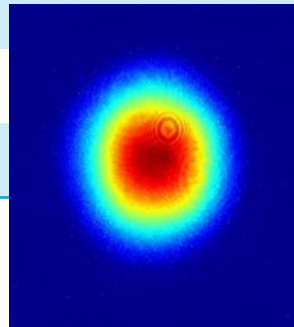
55 J / 10 Hz / 10 ns @ 343 nm (2022)

PERLA[®] 100

Thin-disk laser platform for scientific and industrial applications

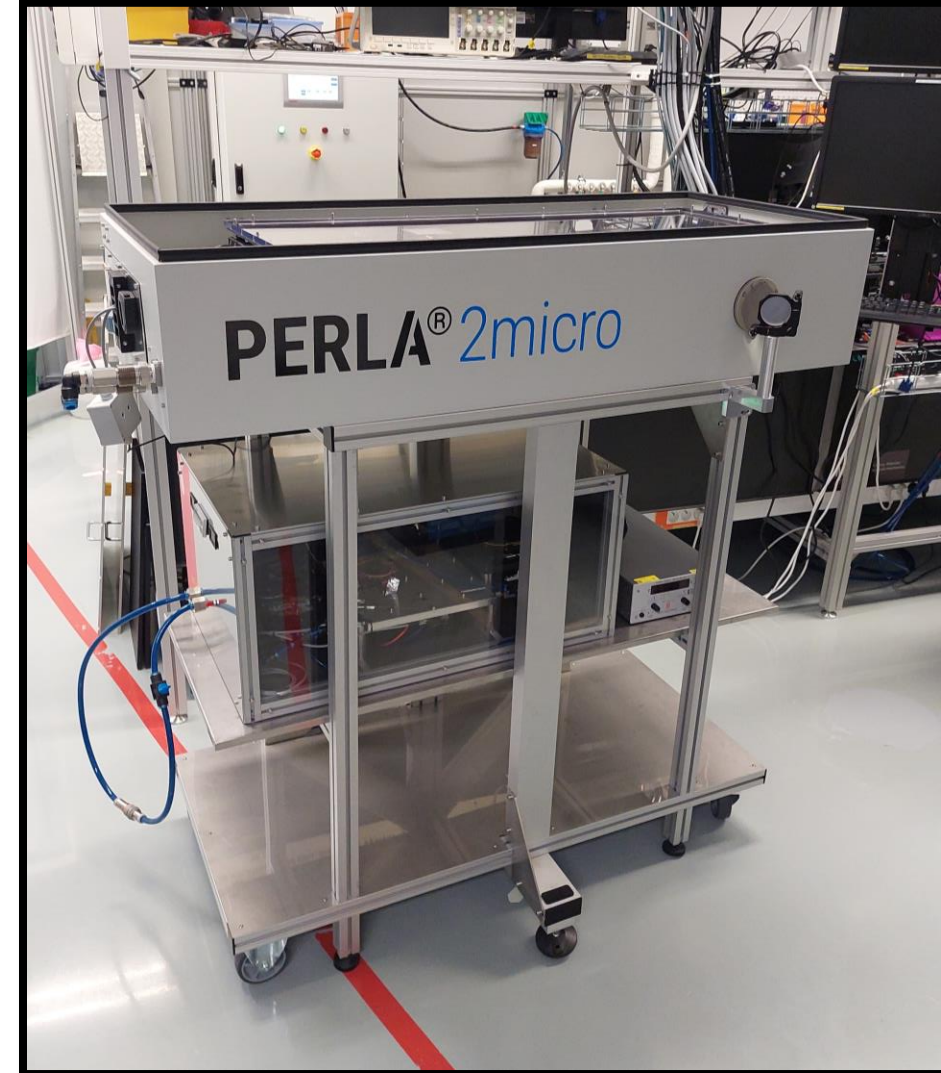
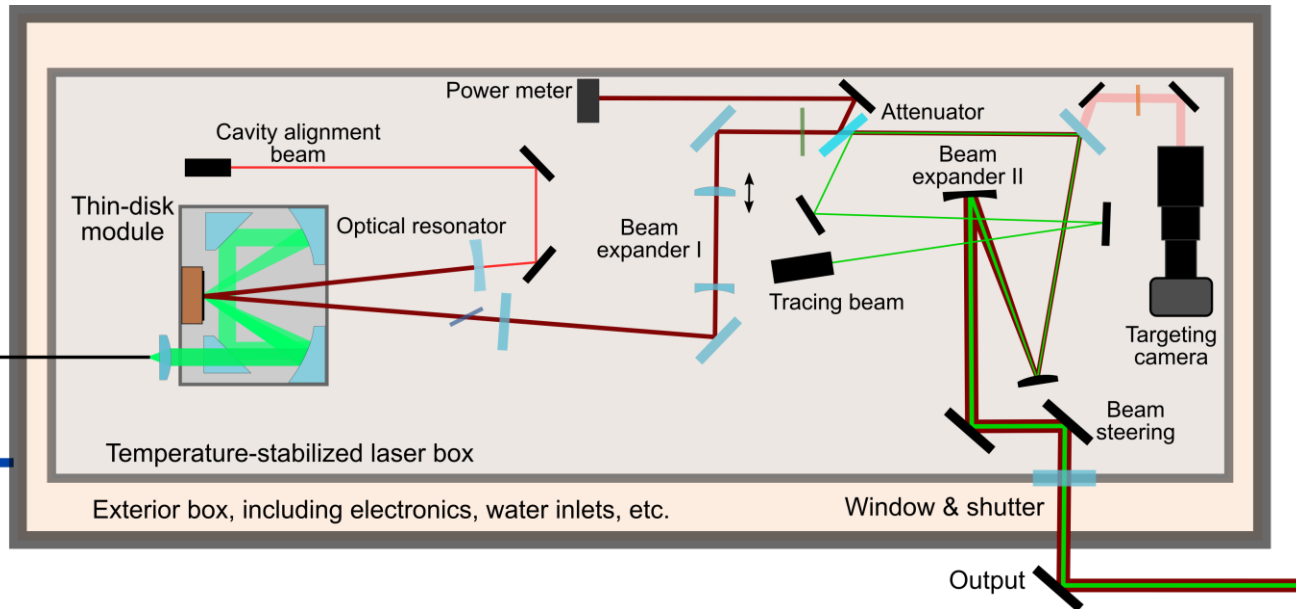
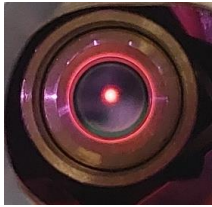
PERLA100 RANGE OF PARAMETERS

Wavelength	1030 nm (515 nm, 343 nm, 257 nm, 206 nm)
Max. av. power	100 W
Rep. rate	1-200 kHz
Max. pulse energy	20 mJ
Pulse duration	≤1 ps
Power stability RMS	<0.5%
Pulse to pulse stability, RMS	<1%
Beam quality	M ² <1.1 @ 1030 nm
RMS pointing stability	<10 urad



Ho:YAG thin-disk laser at 2.1 μm

- In-house-made pump thulium-fiber laser with output power up to 13 W at 1908 nm
- Ho:YAG thin disks manufactured by Crytur
- Maximum CW power > 6 W at 2095 nm
- Wavelength tunable from 2014 nm to 2131 nm
- All integrated in weather-sealed case

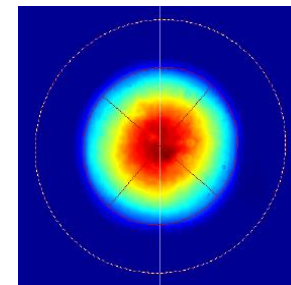


ESTER: a new Laser Product

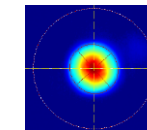
Air-cooled, compact and robust laser developed in collaboration with **Crytur** and **Lightigo**.

Applications

- **Scientific:** LIBS, spectroscopy, and nonlinear optics
- **Industrial:** Material processing, cutting, drilling, and marking
- **Aerospace and Defense:** LIDAR and target designation
- **Medical:** Ophthalmology, dermatology, surgical



Near field beam profile



Far field



Applications

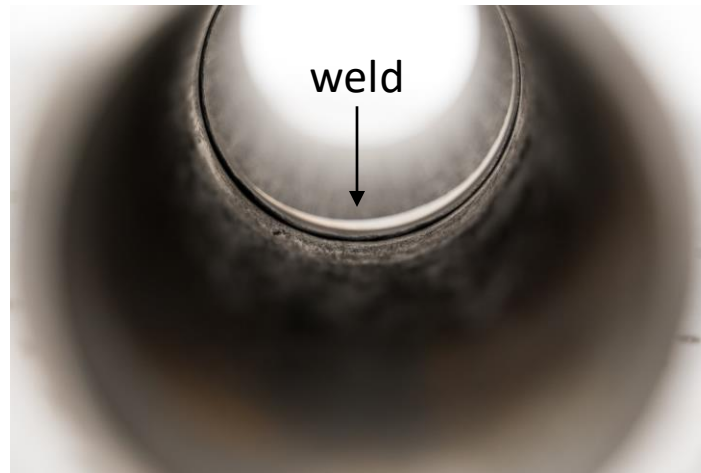


1) Stress corrosion cracking of heterogenous welds

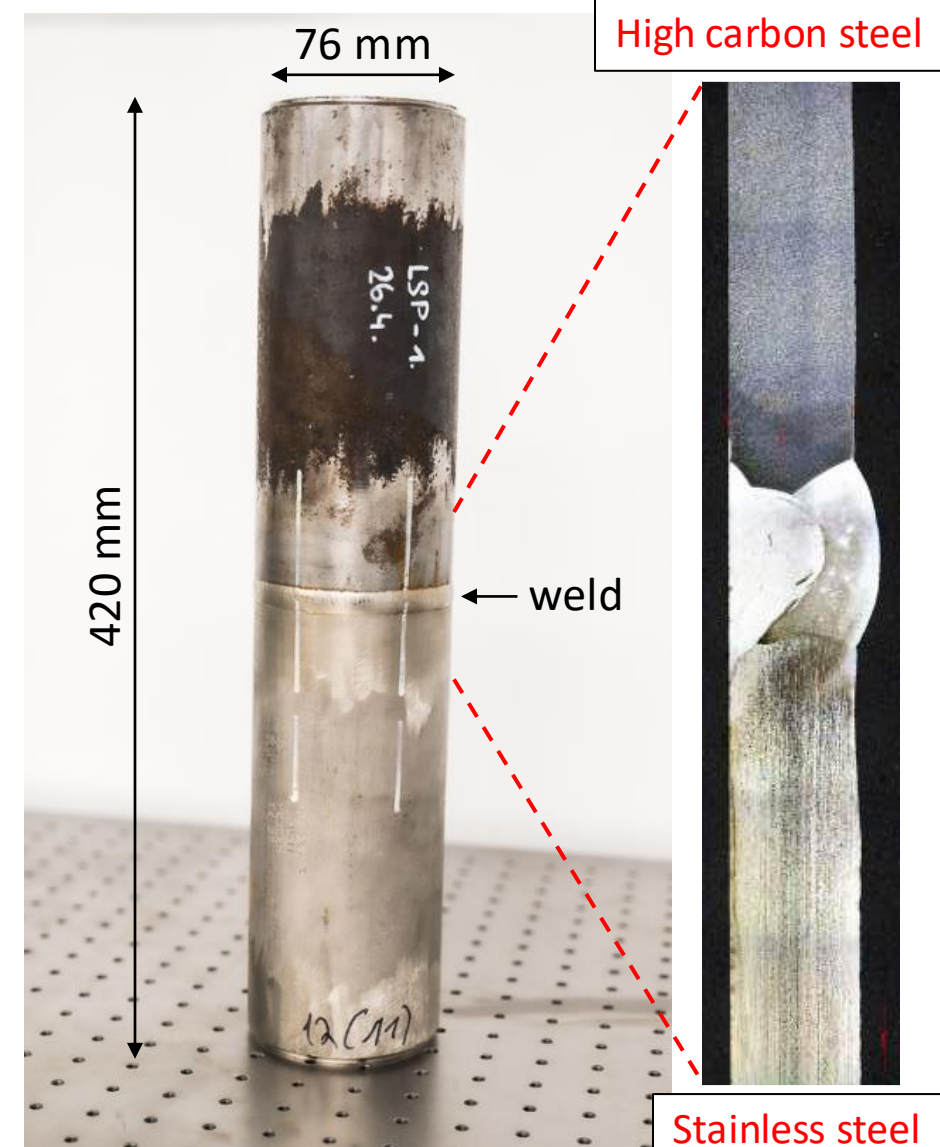
- common problem in nuclear industry (secondary circuit)
 - two dissimilar metals leading to differences in microstructure and mechanical properties
- Laser Shock Peening can be used to counter SCC by generating compressive stresses in the weld area

Pipe problem

- SCC occurs on the inner side of the tube
- the tube is long and narrow which makes it hard to reach inside



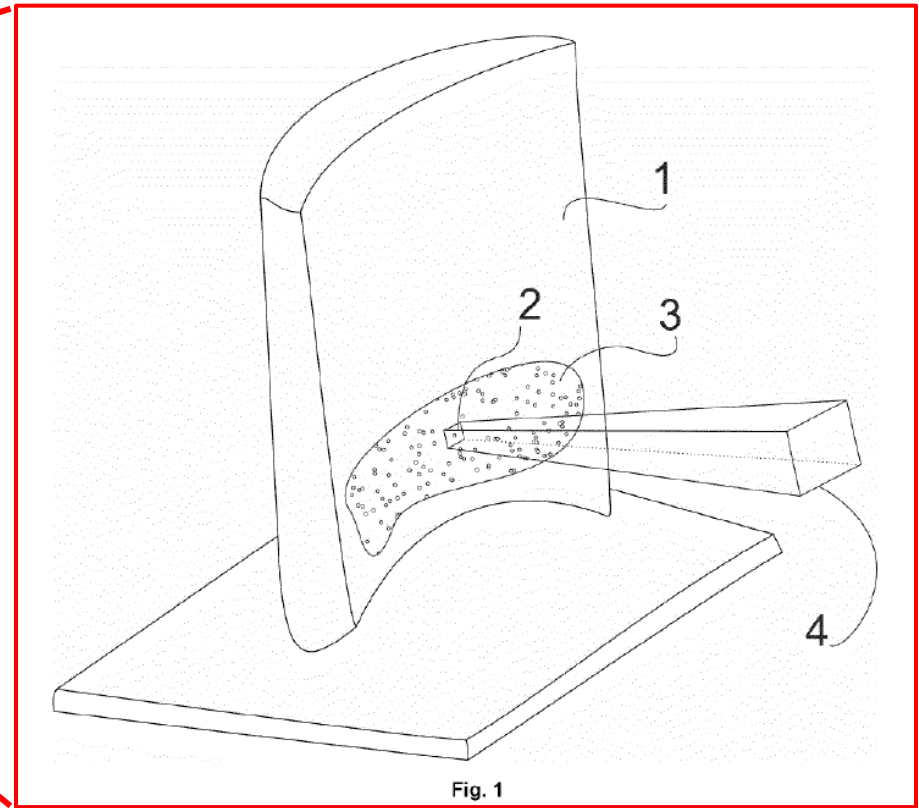
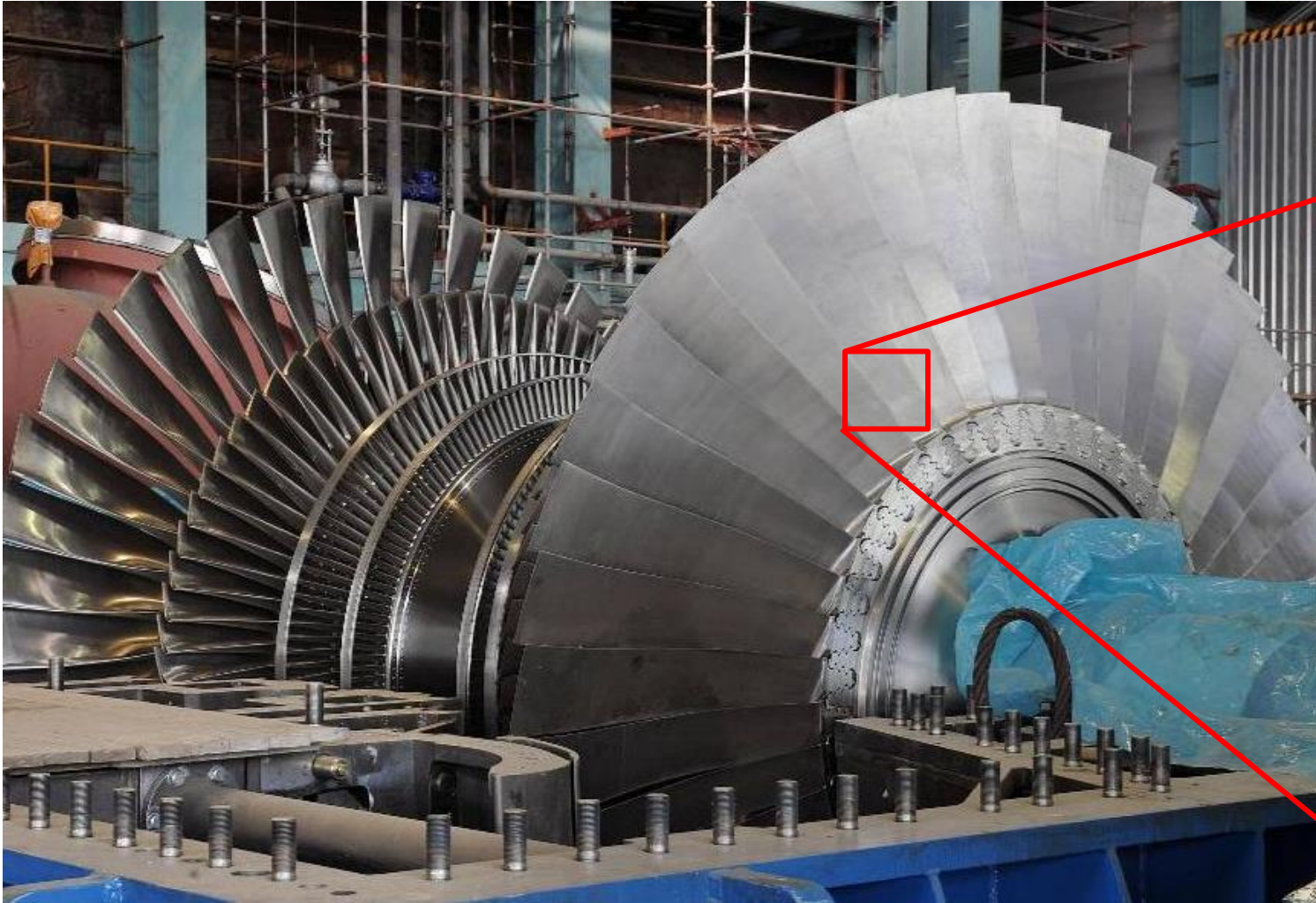
Tube inside



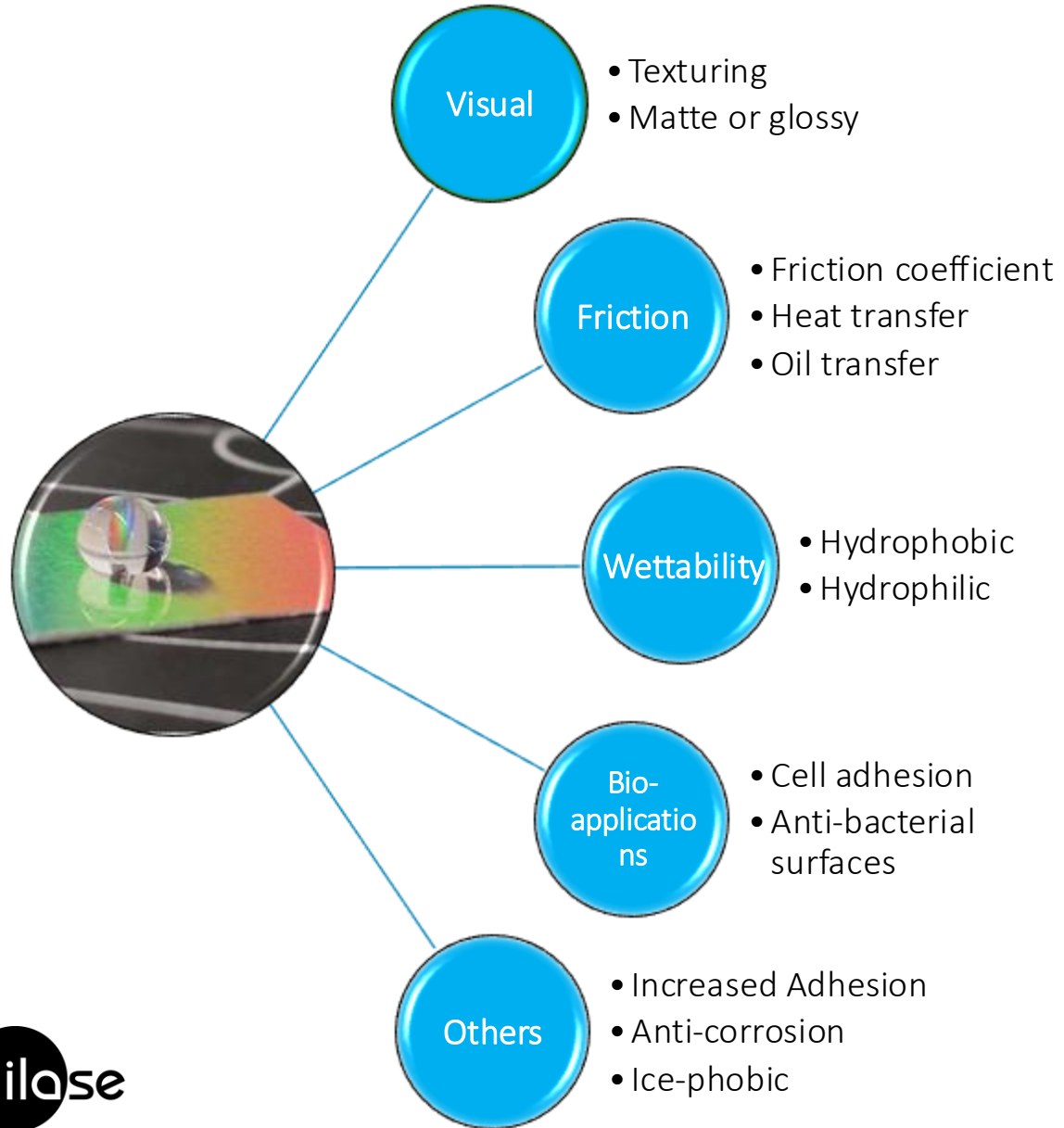
Tube with heterogenous weld

2) Treatment of turbine blades

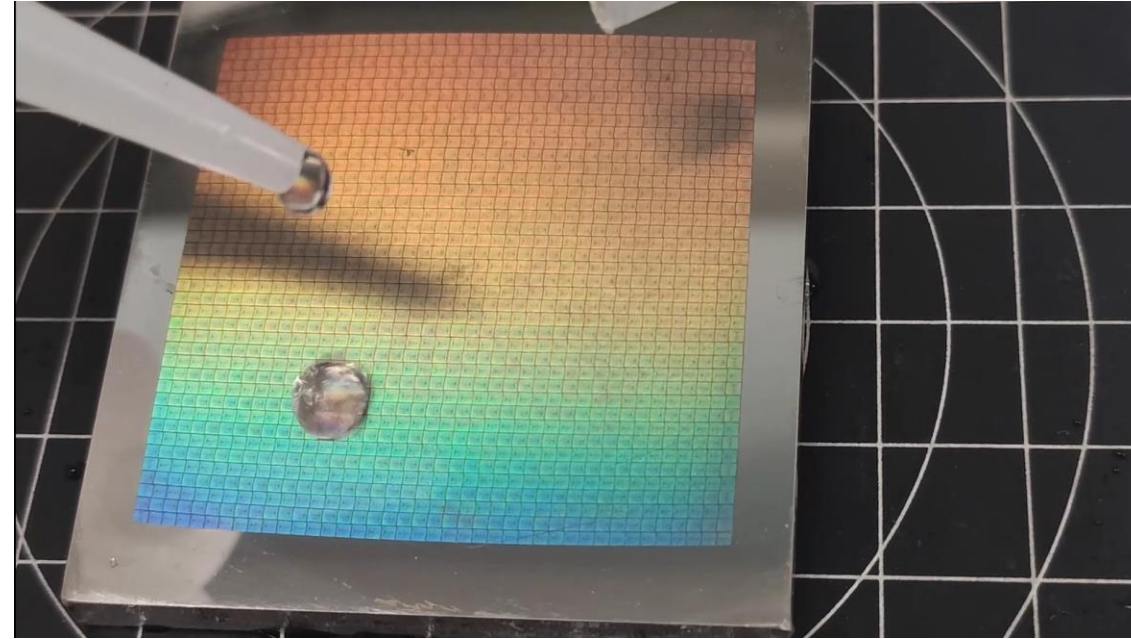
✓ PATENTED



Surface functionalization



➤ Wettability modification



➤ Diffraction on nanostructures; colour hologram

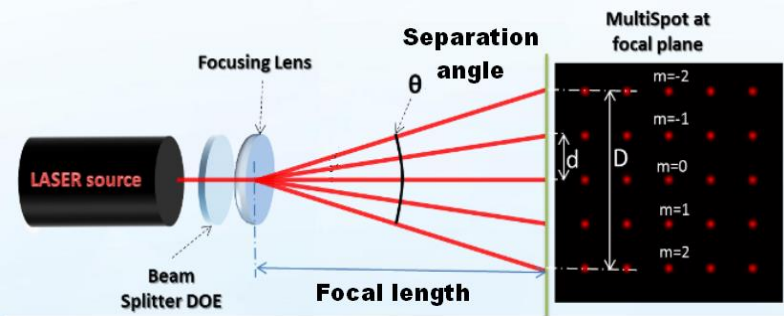


Multibeam processing

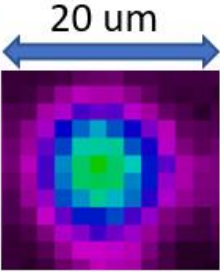
PERLA[®] 100



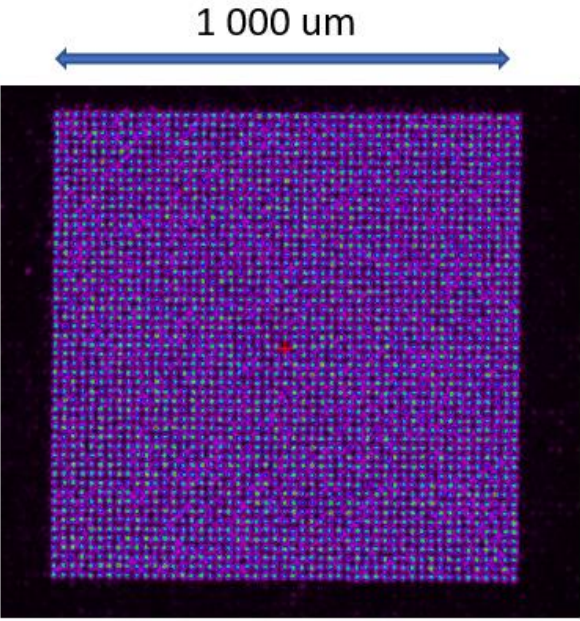
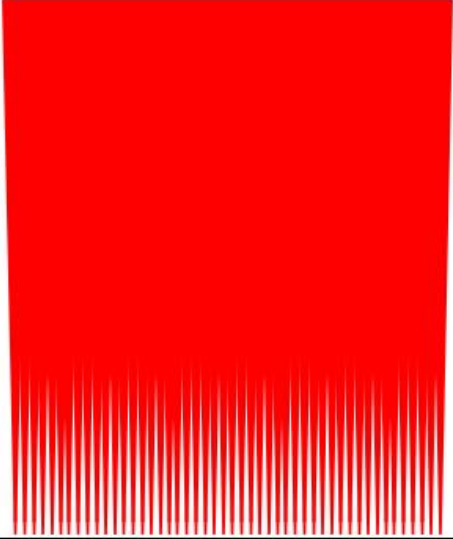
Multi-beam



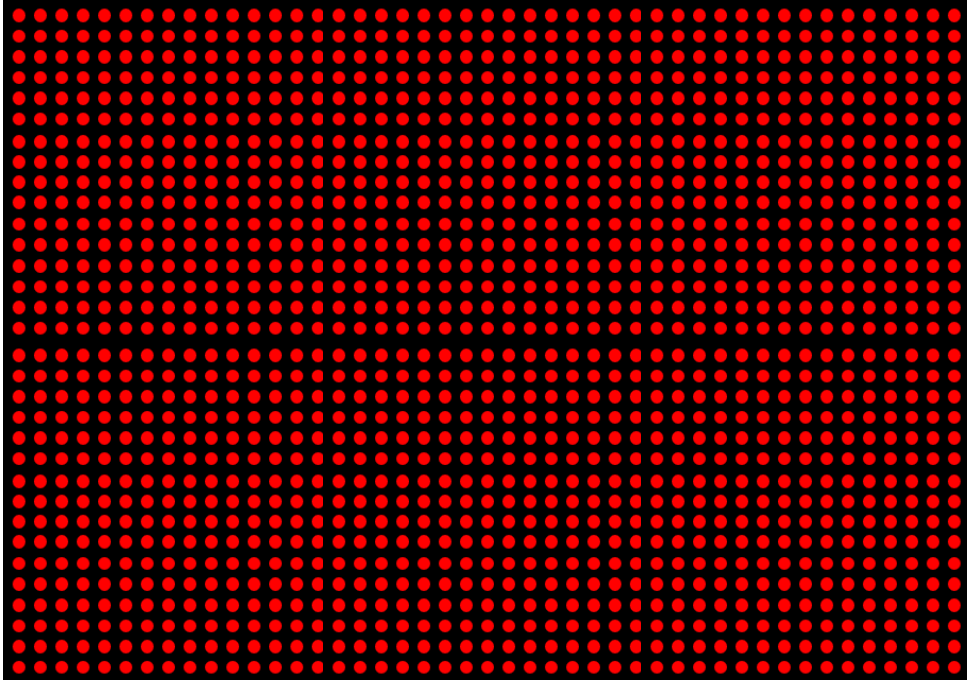
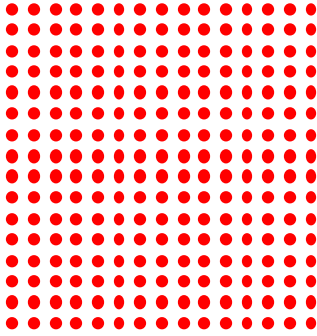
Single beam



DOE Splitter



SAMPLE



Courses offered at the HiLASE Laser Training Centre (LTC) are designed and taught by experts in laser systems, laser applications, and laser safety.



Hilase team: 100 Employees

> 30 Trainers

Recurring trainings



- Laser Safety Training
- Laser Safety Officer Training
- Laser Maintenance
- Laser Mechanics
- Customized Laser Trainings and Workshops (L4EU, PhotonHub..)

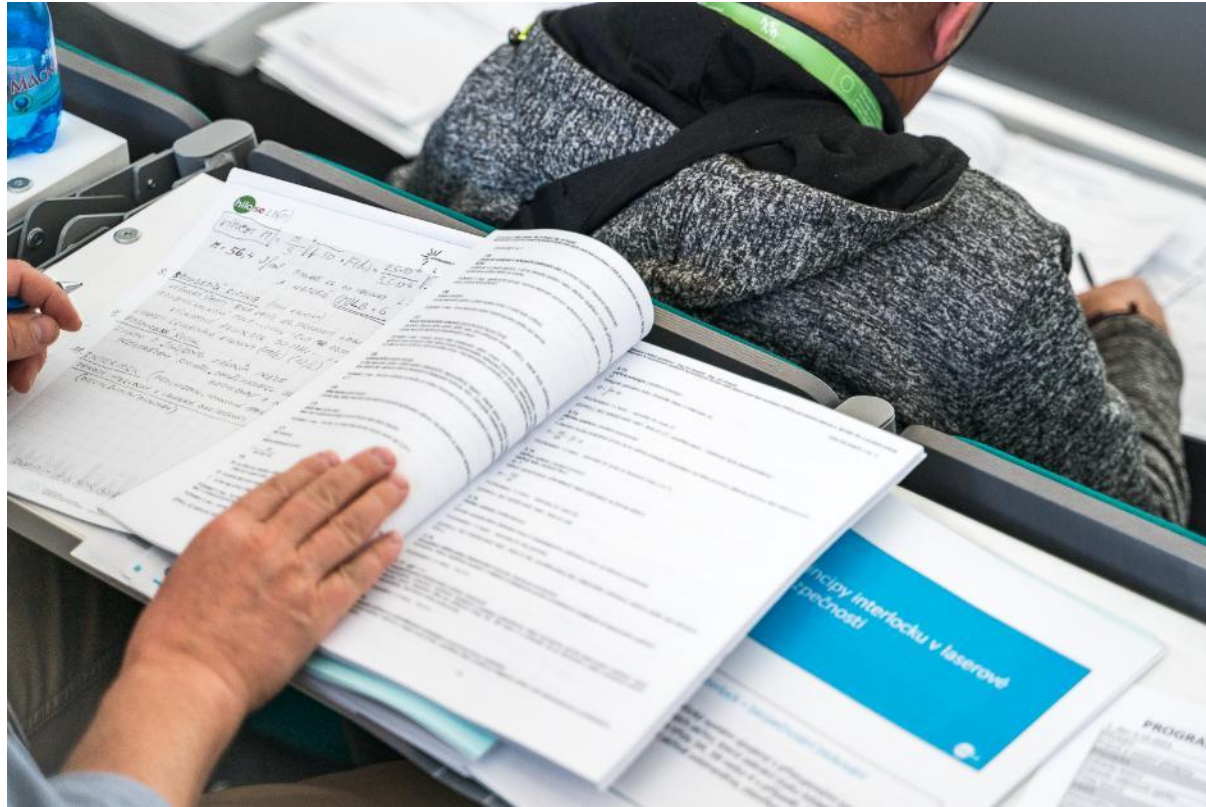


Coming soon...



- Laser Interlocks
- Thermal Simulations
- Basics of Laser Theory

Certificate



Laser Safety Officer – exam



Each participant receive a certificate in CZ/EN



LASER TECHNOLOGIES AND SOLUTIONS. ON EARTH AND BEYOND.

THANK
YOU!

Jan Brajer



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