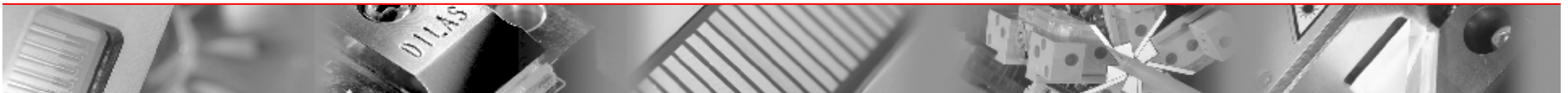


High-power diode-laser modules and their applications

Jörg Neukum



**Laser 2007 Munich
Workshop / World of Photonics**



DILAS Diodenlaser GmbH

DILAS GmbH

founded 1994

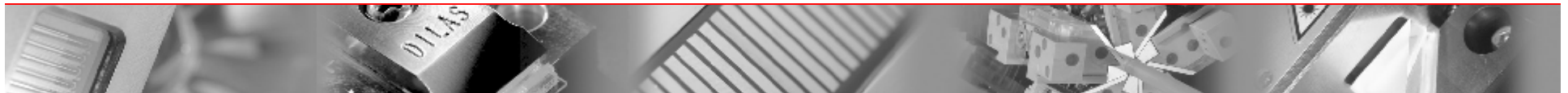
**located in Mainz
Germany**



DILAS Inc.

founded 2005

**located in Tucson
Arizona**



DILAS in numbers



Founded: 1994

Employees:

181

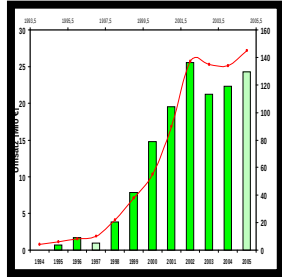
11

Majority

Shareholder:

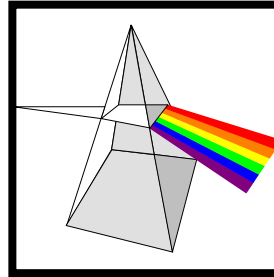
Rofin Sinar
Technologies Inc.
since 1997
(Nasdaq RSTI)

ISO 9001-2000
certified Quality



Markets:

- DPSSL pumping
- Material processing
- Graphic Arts
- Medical
- Defence
- Instrumentation



Research:

38 academics
& engineers

R&D Budget:

~11% of revenue



Facilities:

- Mainz / Germany
- § 2 buildings
- ~3300m² total
- § 500m² clean room with class 100 workbenches
- § other production area of ~700m²

- Tucson / Arizona
- § 300m² facility

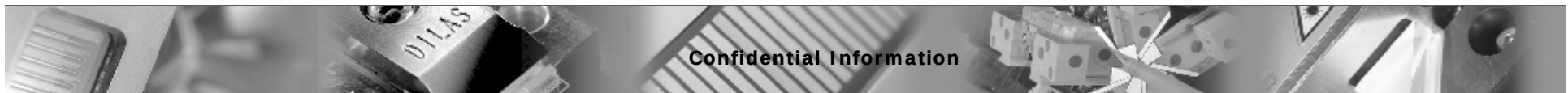
Sales offices:

representatives
in all major market
areas or direct sales
from headquarter



Products:

- § Laser diode bars
- § Laser diode stacks
- vertical / horizontal
- § Fibre coupled LD
- § Laser Diode Systems
- § custom solutions
- § available wavelength
- 650...690nm
- 785nm, 792...797nm
- 808nm
- 830nm
- 880nm
- 915nm
- 940nm
- 980nm
- 1064nm
- 1470nm and higher



Wavelength / Application < 800nm

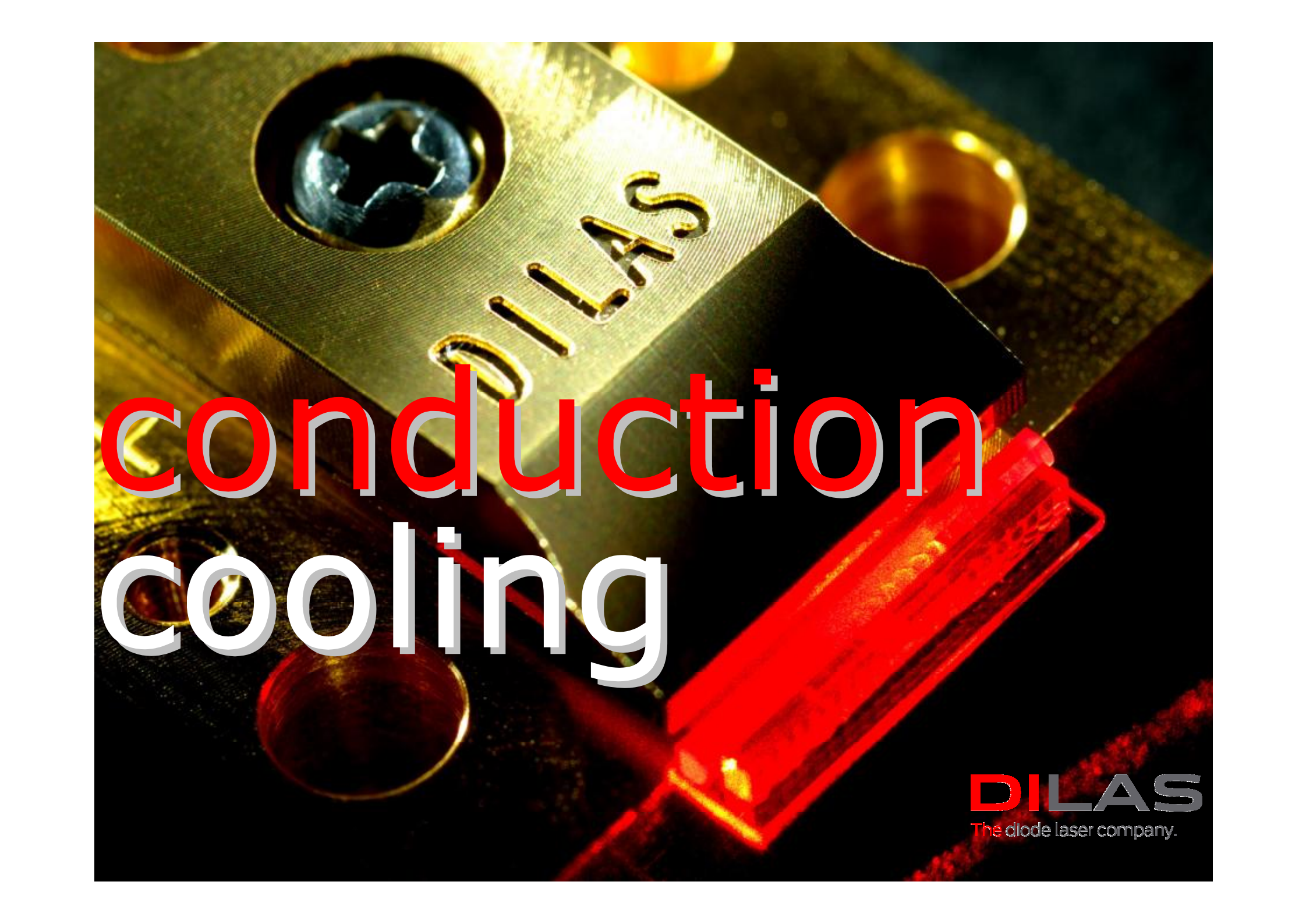
WAVELENGTH	APPLICATION	MARKET
630 – 635nm	Medical Photodynamic Therapy	Medical
652nm	Medical Photodynamic Therapy	Medical
668nm	Medical Photodynamic Therapy	Medical
670nm	Cr ³⁺ : LiSAF – fs-Laser	DPSSL
689nm	age-related macular degeneration	Medical
730nm	Medical Photodynamic Therapy	Medical
780nm, $\Delta\lambda < 1\text{nm}$	Diode Pumped Gas Laser (Rubidium Vapour)	Military (High Energy Laser)
785nm	TM ³⁺ : YAG => 2 μm	DPSSL
792 / 797nm	Nd ³⁺ : YLF	DPSSL
795nm, $\Delta\lambda < 1\text{nm}$	Rb ³⁺ / Xe ¹³⁹ - pumping	Instrumentation

Wavelength / Application 800 – 1000nm

WAVELENGTH	APPLICATION	MARKET
801nm	TM ³⁺ : YAG => 2μm	DPSSL
805 /808nm	Nd ³⁺ : YAG	DPSSL
810± 10nm	hair removal, etc.	Medical, MAT
830nm	Pre-Press, Computer to plate (CTP), direct on press (DOP)	Printing
852nm, $\Delta \lambda < 1\text{nm}$	Diode Pumped Gas Laser (Cesium Vapour)	Military (High Energy Laser)
868 – 885nm	Nd ³⁺ : XXX (various host crystals)	DPSSL
901nm	Yb ³⁺ : SFAB	DPSSL
905nm	Rangefinder direct	Instrumentation
915nm	Yb: Glas, Fiber Laser, Medical	DPSSL, Medical
940nm	Yb ³⁺ : YAG, Disk	DPSSL
968nm $\Delta \lambda < 1\text{nm}$	Yb ³⁺ : YAG, Disk	DPSSL
973 – 976nm	Yb ³⁺ : Glas, Fiber Laser	DPSSL
980± 10nm	Medical	Medical, MAT

Wavelength / Application > 1000nm

WAVELENGTH	APPLICATION	MARKET
1064nm	Medical	Medical
1330 – 1380nm	Medical	Medical
1450 – 1470nm	Akne, Turbulence Detection Er ³⁺ pumping	Medical, various others
1530-1570nm	Rangefinder	Military
1700nm	Missile Defence	Military
1850nm	Turbulence Detection, Plastic welding & Material processing on transparent Material	Military, MAT,
1900-2000nm	Coagulation of Protein	Medical



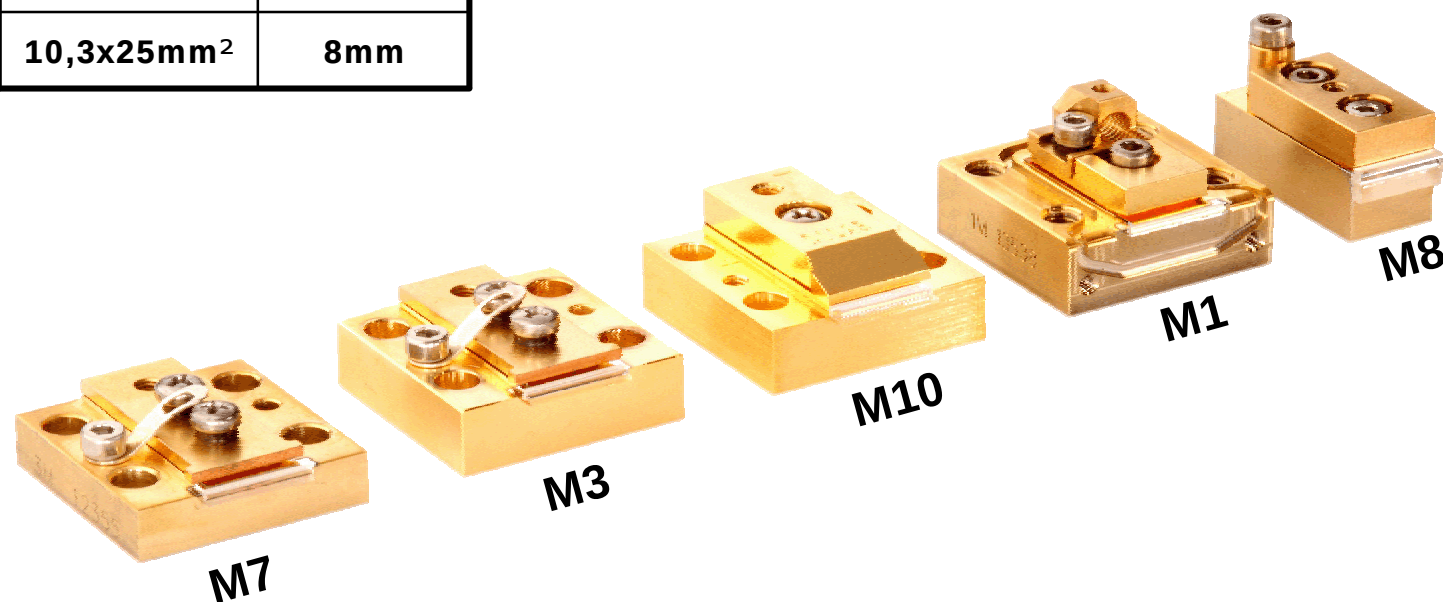
conduction cooling

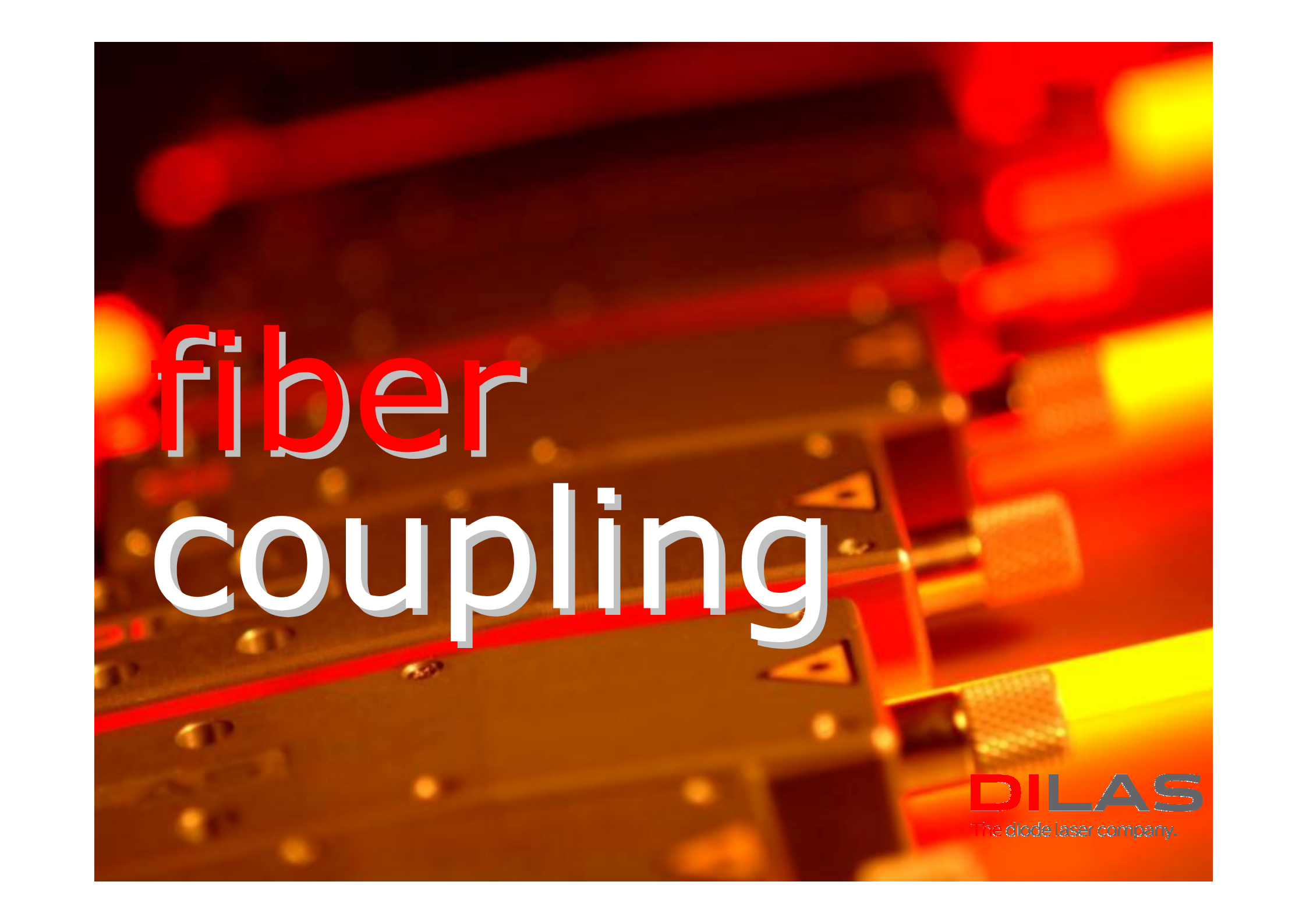
DILAS
The diode laser company.

Conduction cooled bar – packages

Package Type	Footprint	Beam height
M7	25x25mm ²	6,0mm
M3	25x25mm ²	7,7mm
M10	25x25mm ²	7,95mm
M1	25x25mm ²	8,7mm
M8	10,3x25mm ²	8mm

**40W+ cw
at standard
wavelength**



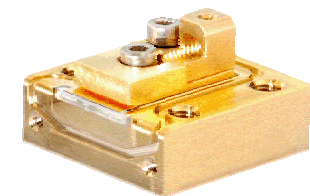


fiber coupling

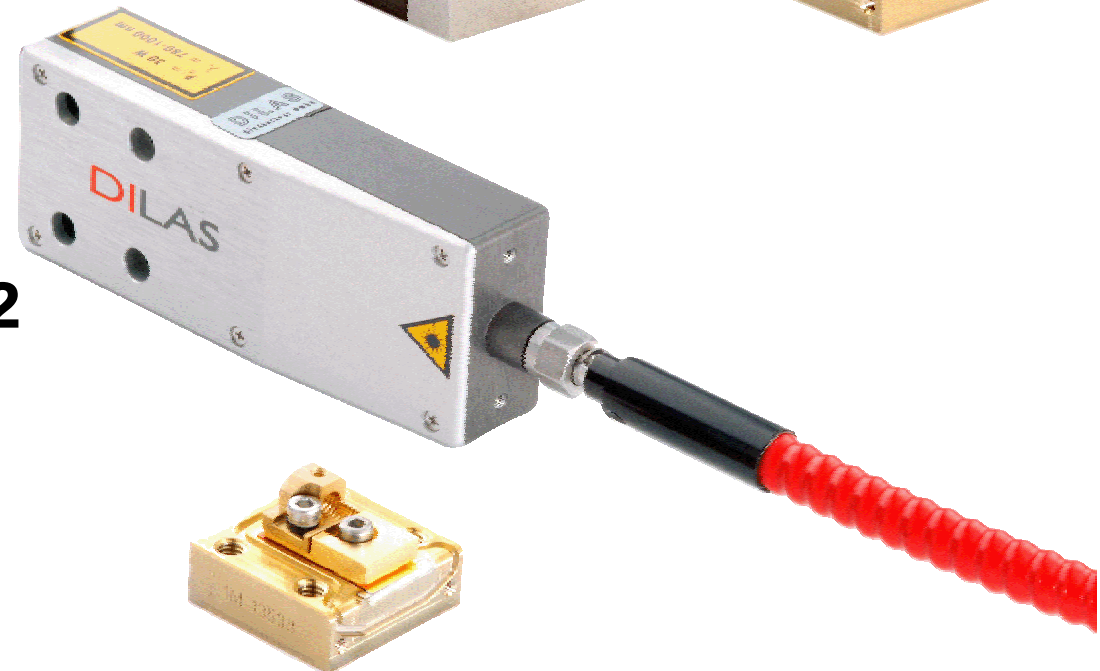
DILAS
The diode laser company.

FC Conduction cooled single bar

40W
400 μ m
NA 0.22
**incl. power monitor,
pointer and fiber interlock**



30W
200 μ m
NA 0.22



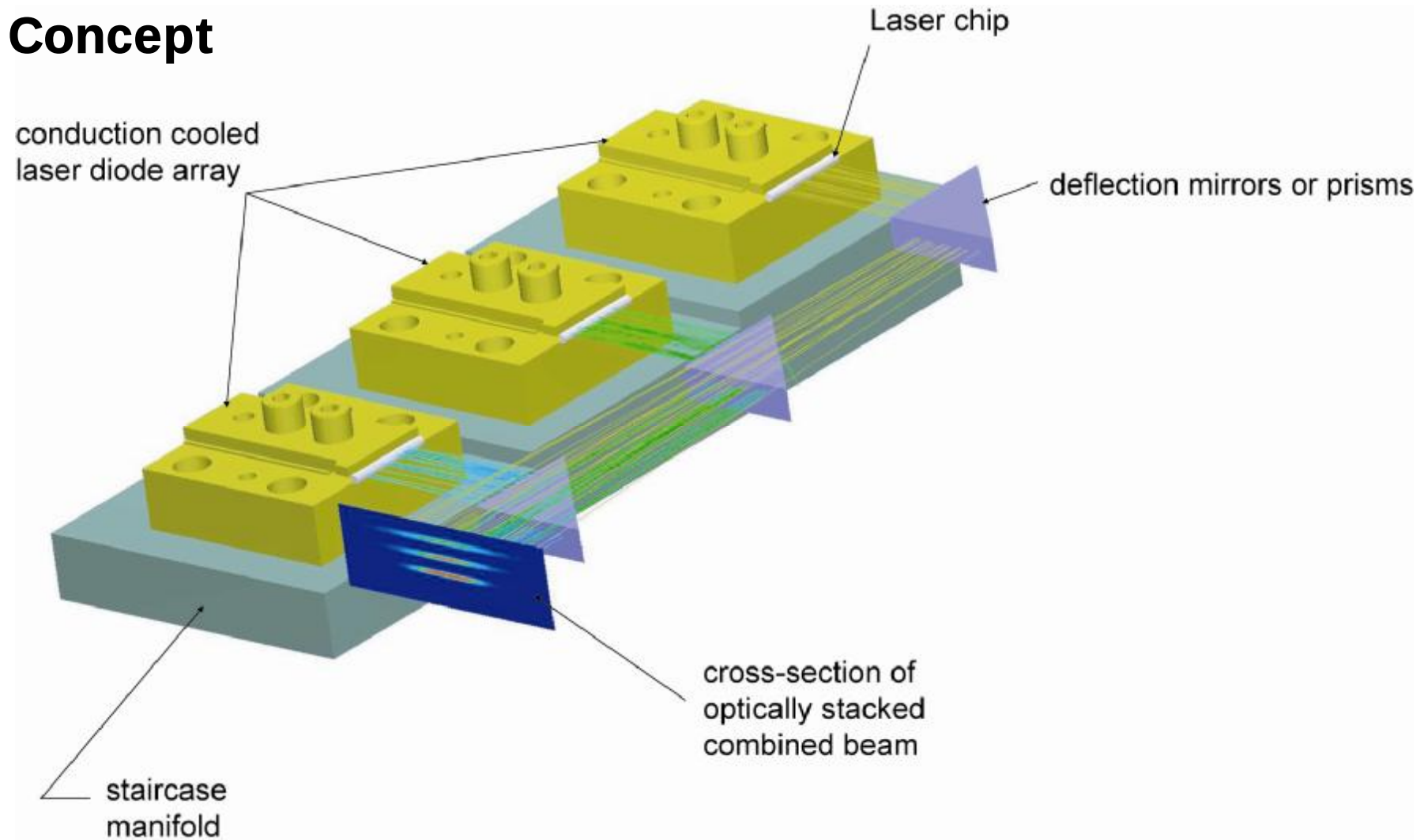


fiber coupled multi-bar

DILAS
The diode laser company.

FC Conduction cooled Multi-bar

Concept



FC Conduction cooled Multi-bar

100W
400 μ m
NA 0.22

or

50W
200 μ m
NA 0.22



FC Conduction cooled Multi-bar

200W

400 μ m

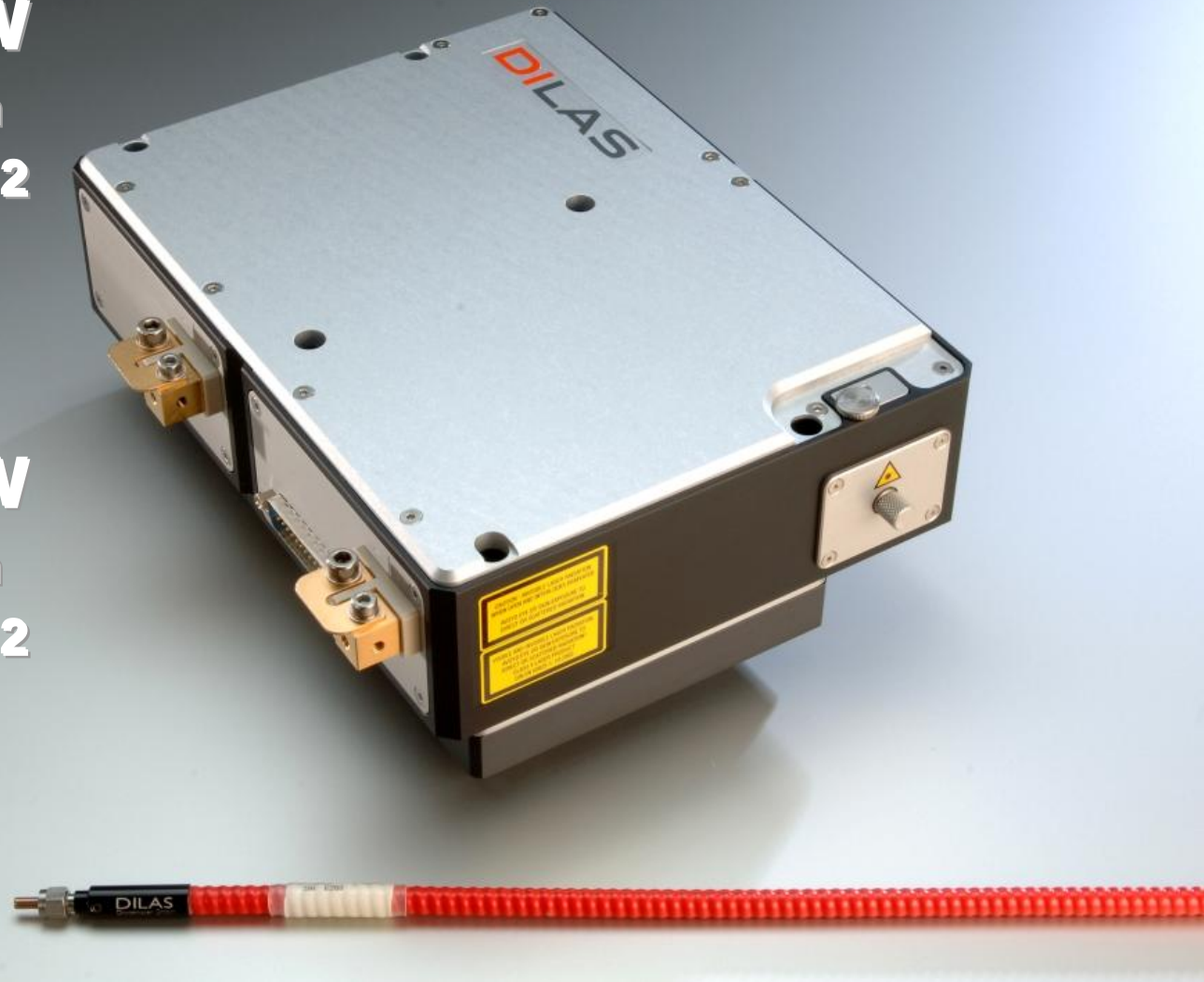
NA 0.22

or

100W

200 μ m

NA 0.22



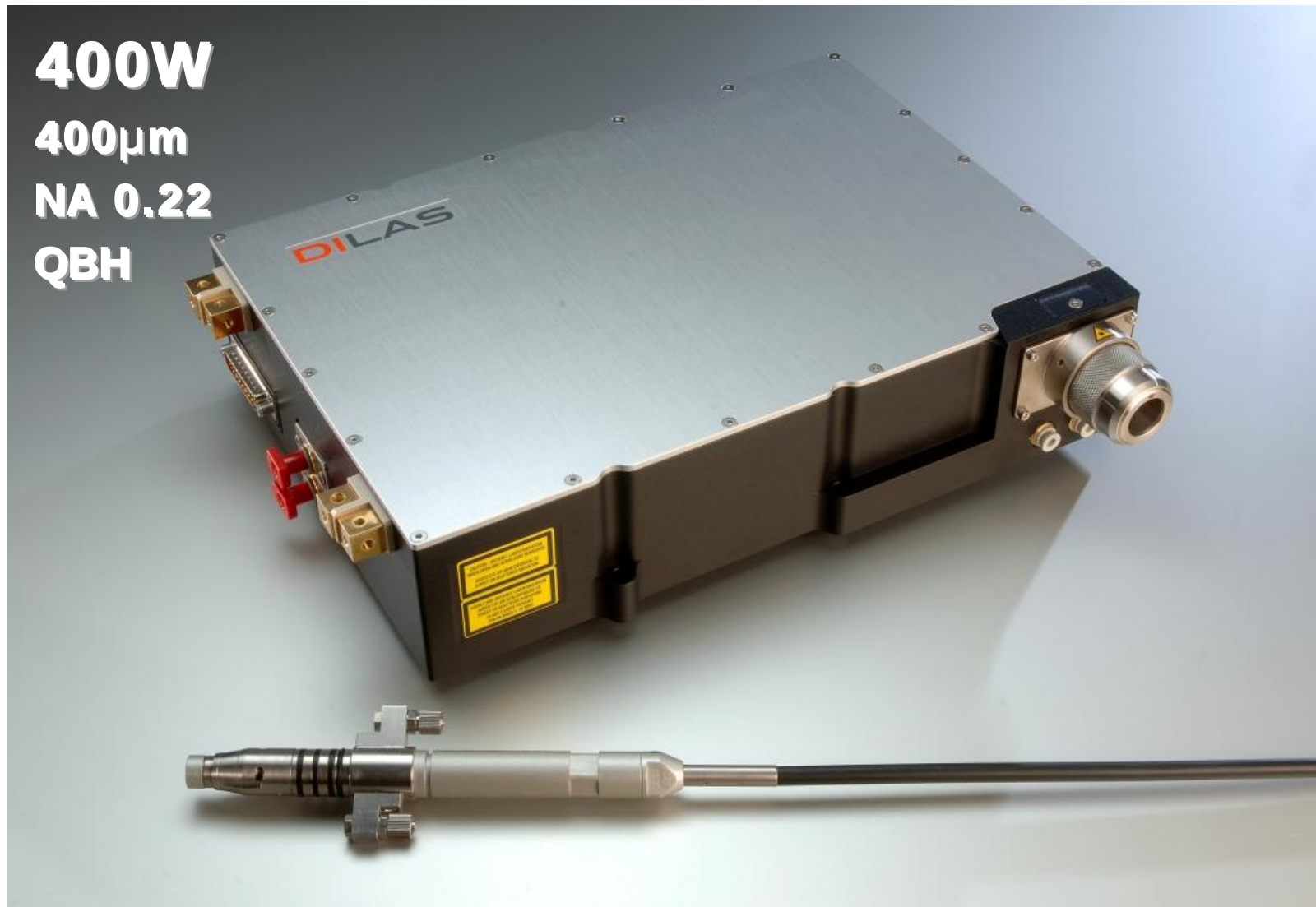
FC Conduction cooled Multi-bar

400W

400 μ m

NA 0.22

QBH

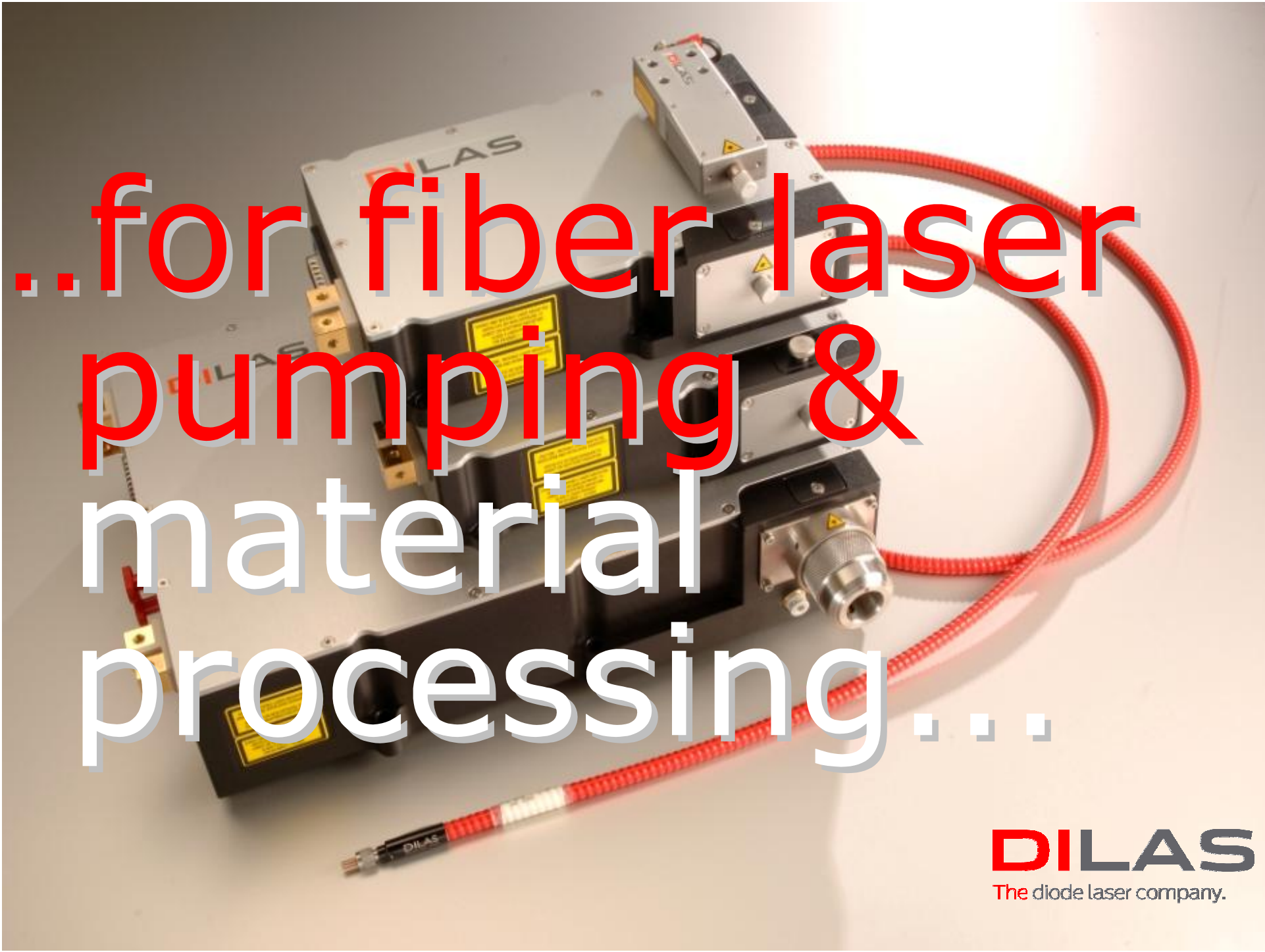


FC Conduction cooled Multi-bar

Module Type	Number of bars inside	fiber core diameter, numerical aperture	800-980nm	1470nm
IS3.2 (H200)	2x1	SMA 400µm, NA 0.22	60W	
IS3.1 (H139)	3x1	SMA 400µm, NA 0.22	100W	40W
IS5.6 (H242)	6x1 (3x2)	SMA 400µm, NA 0.22	200W	80W
IS5.3 (H293)	4x1 (2x2)	Liquid cooled SMA, 200µm, NA 0.22	120W @ 976nm	
IS11.6 (H271)	12x1 (6x2)	QBH, 400µm, NA 0.22	400W @ 808 or 976nm	

All ISQ's contain hour counters and temperature sensors (NTC)
Options: P=pointer, F=fibre interlock, M=power monitoring

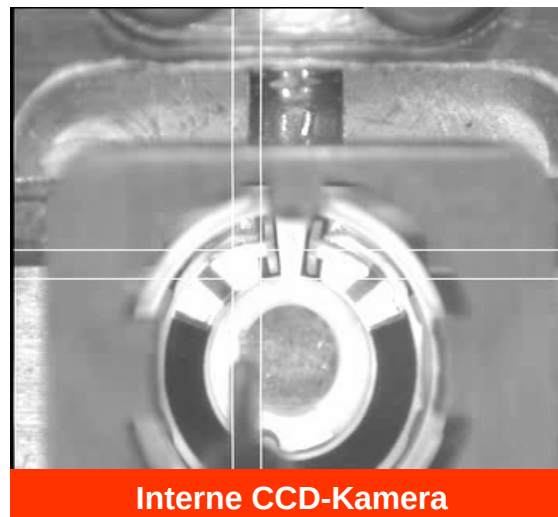


A photograph of a DILAS laser pump module, a black and silver industrial device with yellow warning labels. A red braided fiber optic cable is connected to the front and loops around the top. A small fiber optic cable with a red and white striped jacket lies in the foreground. The background is a plain, light-colored surface.

..for fiber laser
pumping &
material
processing...

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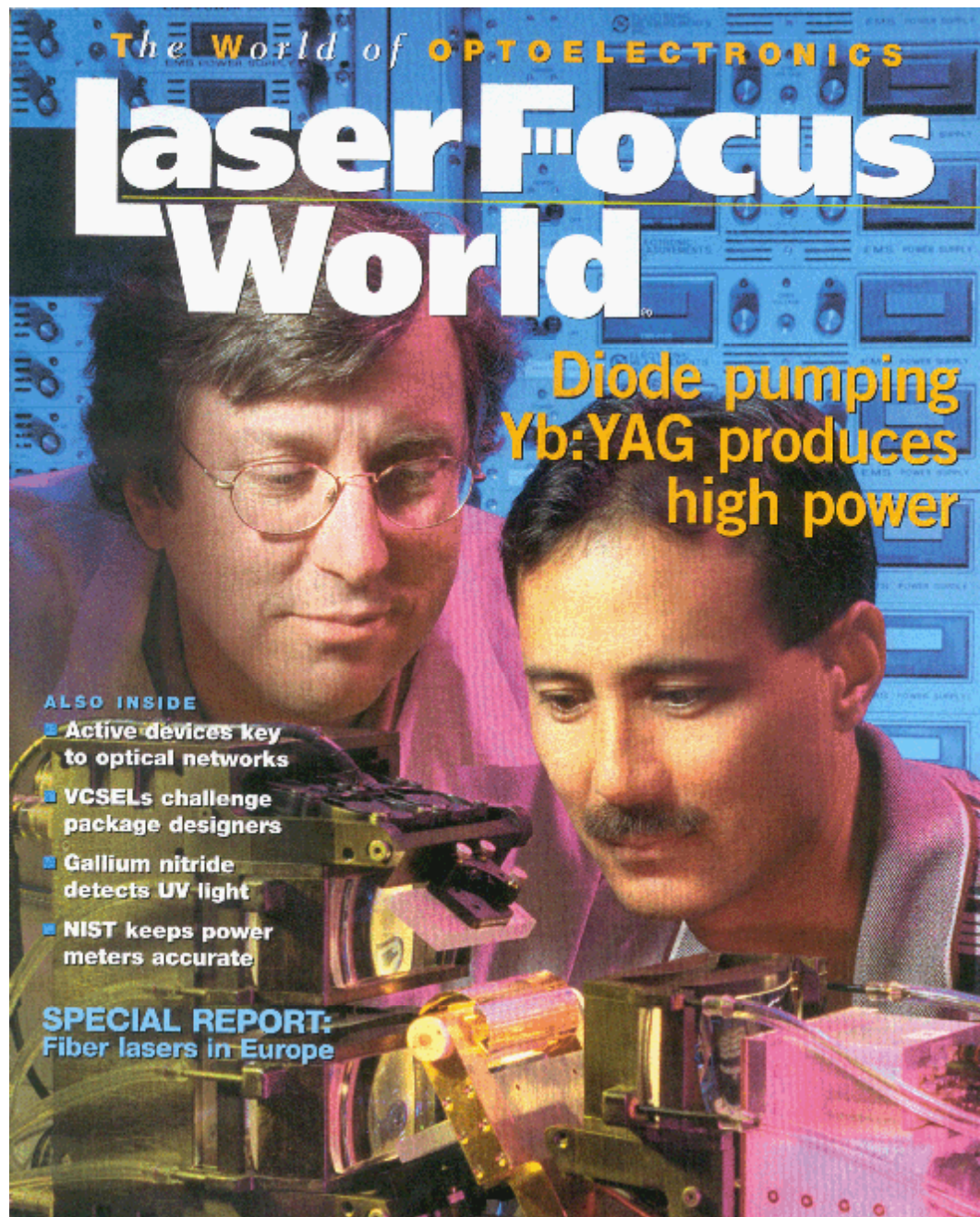
Soldering in electronic manufacturing





2D-stacks
lensed.

DILAS
The diode laser company.



DILAS
The diode laser company.

2-Dimensional Stacks IV

2001 - 6x10 bar CW lensed



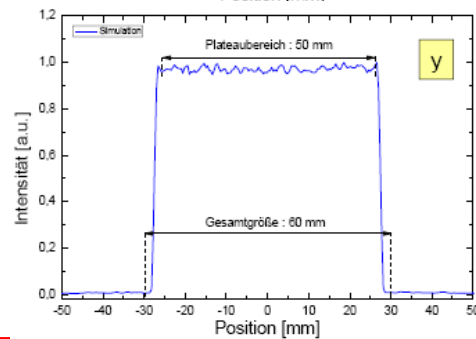
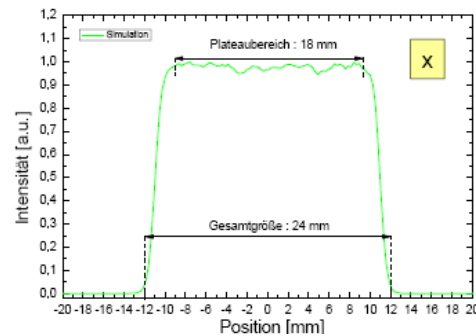
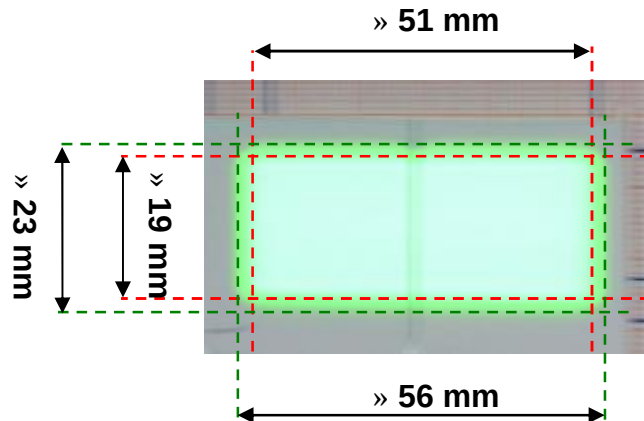


11 x 8 stacks
each stack
25 bars stack
264 kW total
1msec pulse
941nm

scalable
stacks

DILAS
The diode laser company.

10kW homogenized spot (60x18mm²)



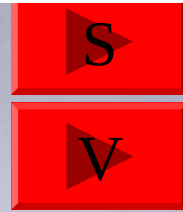
10 kW

The background of the slide features a close-up of electronic modules, likely avionics, with prominent red and blue lighting. The modules have various components like screws, connectors, and heat sinks visible. The text 'Modules for avionics' is overlaid in the center.

Modules for avionics

DILAS
The diode laser company.

Modules for space



DILAS
The diode laser company.

Thank you for your attention

**Please
visit us at
B3.401**

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