IPG Laser GmbH

1st internal workshop for the project partners

POLY BRIGHT

Turin, 15. März 2011

IPG PHOTONICS®

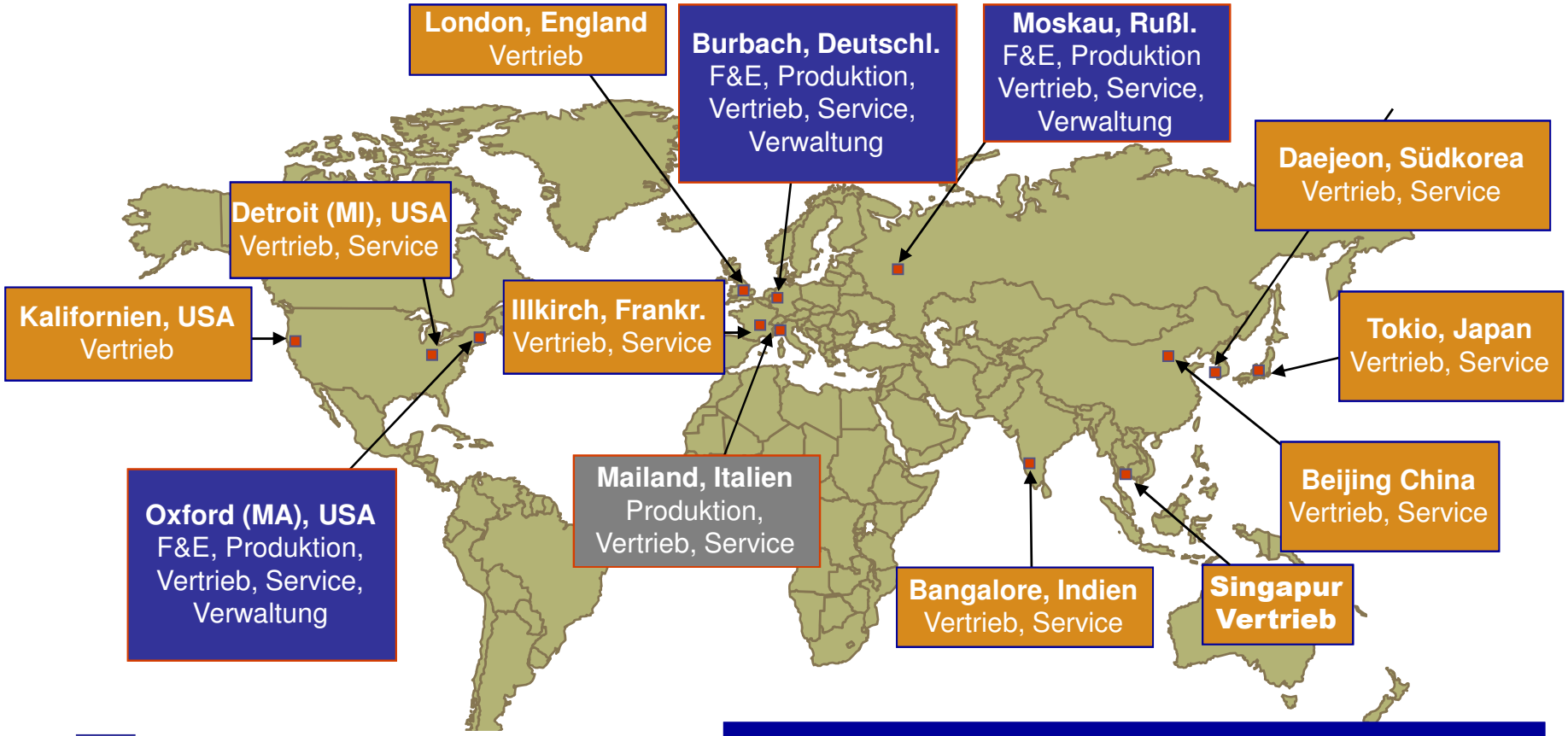
The Power to Transform®

Michael Stark
IPG Laser GmbH, Burbach, Germany

Contens

1. IPG Laser GmbH
2. Principles of IPG fiber lasers
3. IPG Fiber Lasers for Material Processing
4. Applications low power
5. Applications high power
6. Specifications of ELR-120 & TLR-120
7. Outlook ELS-500

Weltweite Präsenz



- **Produktion, Service, Vertrieb, F&E**
- **Produktion, Service, Vertrieb**
- **Vertrieb und Service**

- 58.000 m² Produktions- und Bürofläche
- 1.420 Mitarbeiter

Vertikale Integration der Produktion

Fab Operations

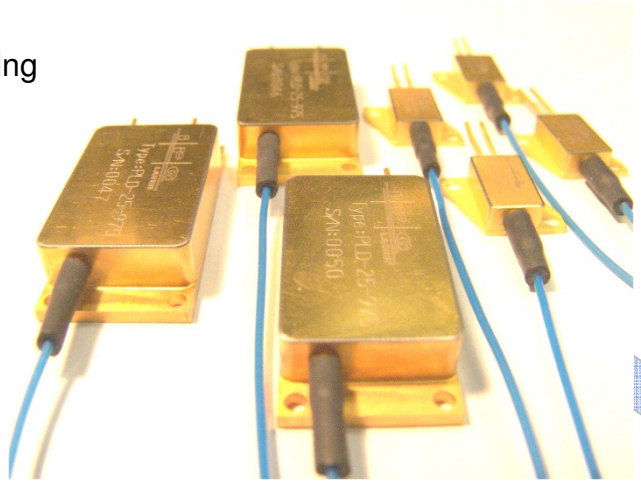
Semiconductor Wafer Growth

Diode Processing

Chip Mounting

Burn-In

Laser diode Packaging



Optical Preform

Silica based glass

MCVD method

Dope with rare earth ions

Final Assembly

Coupling

Final burn in

Shipment

Fiber Draw

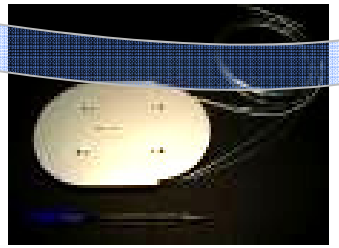
3 Draw towers

Active fibers only

>200 different fibers

Modules

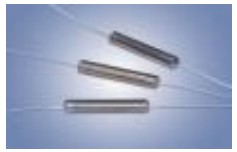
Up to 500-1500 Watts



Fiber Block

Pod of active fibers

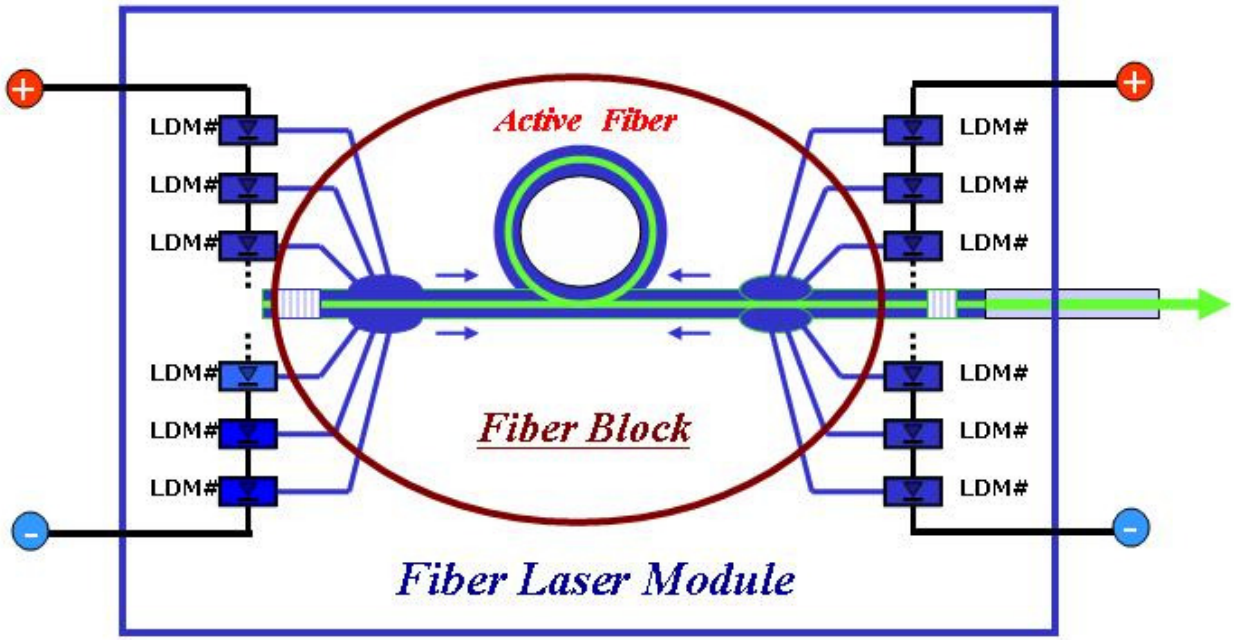
Components



Bragg Gratings, Isolators

Couplers

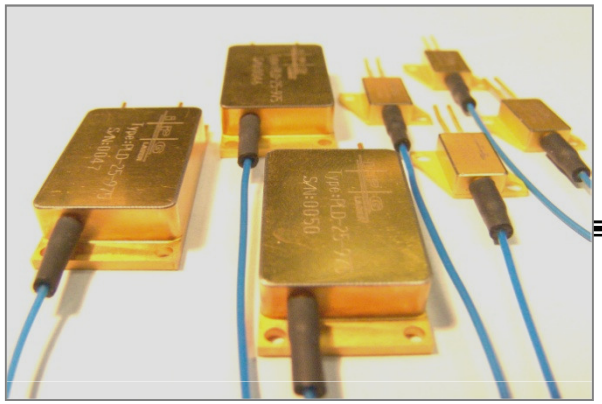
Schematic of Fiber Lasers



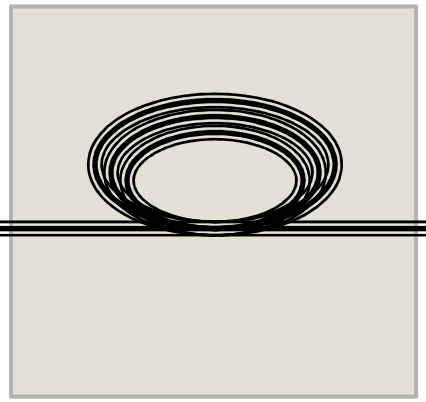
- Compact and monolytical design
- NO „Free Space Optics“
- Parallel Pumping by PLD
- Monomode-Beamquality $M^2 < 1.05$
- Robust mechanical design
- Thermal insensitive
- No alignment of the laser

Aufbau Faserlaser - Strahlkonvertierung

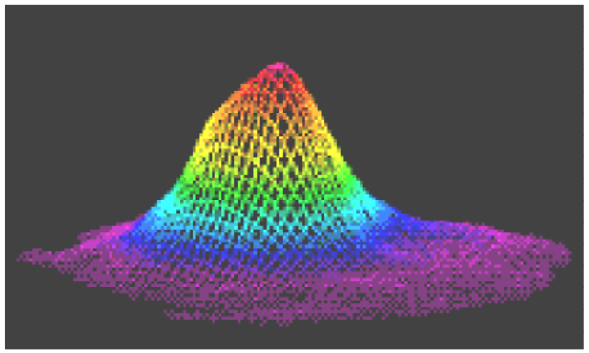
Breitband-Multimode-Einzelemitter
970nm +/- 10nm



Faserblock

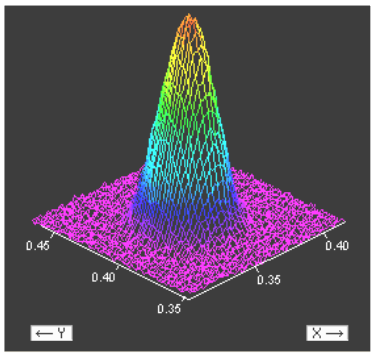


Grundmode Faserlaser
1070nm (500W – 1500W)



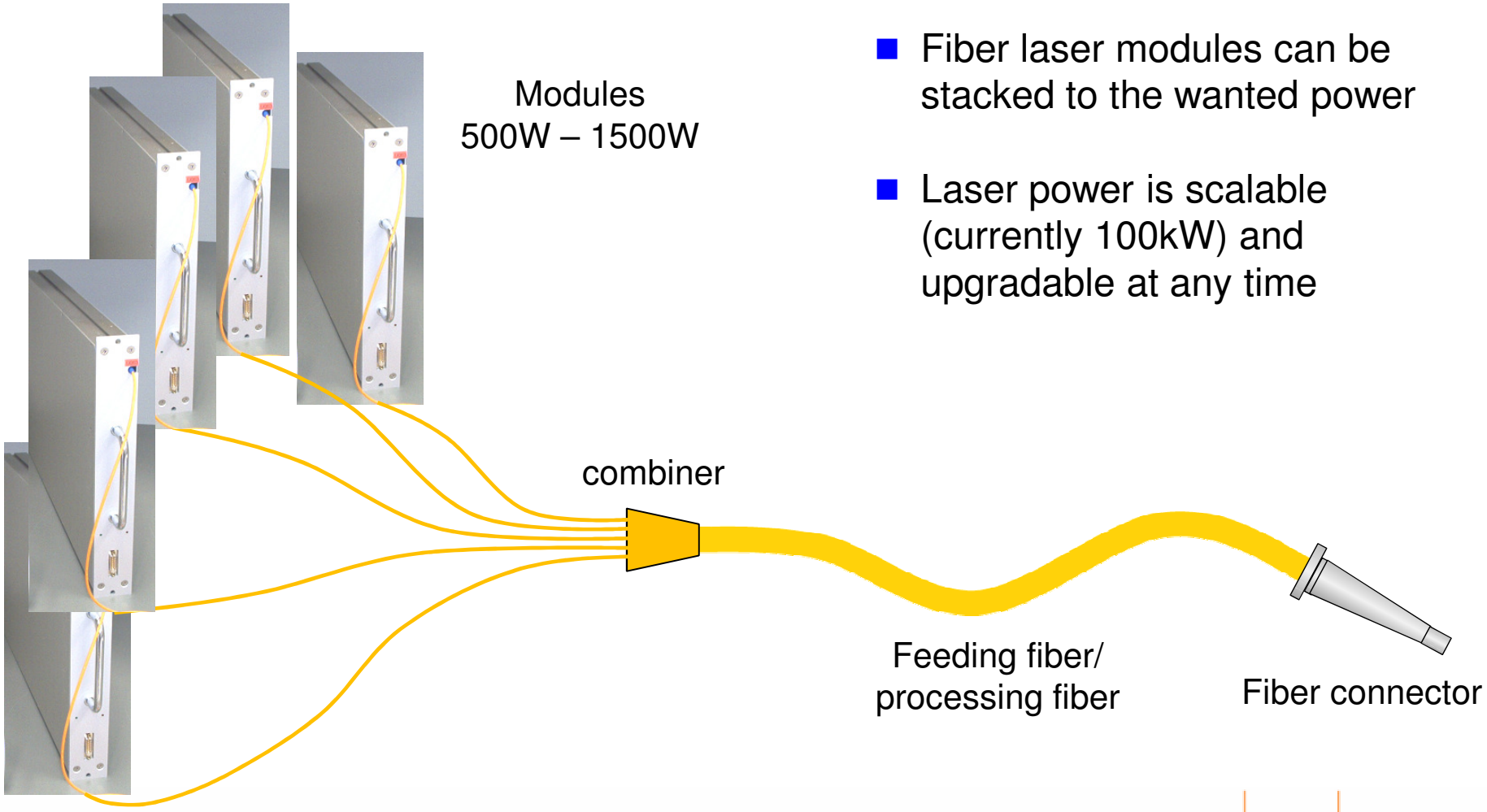
Multimode; NA=0,12; M^2>20

Konvertierung durch
Yb-dotierte Faser



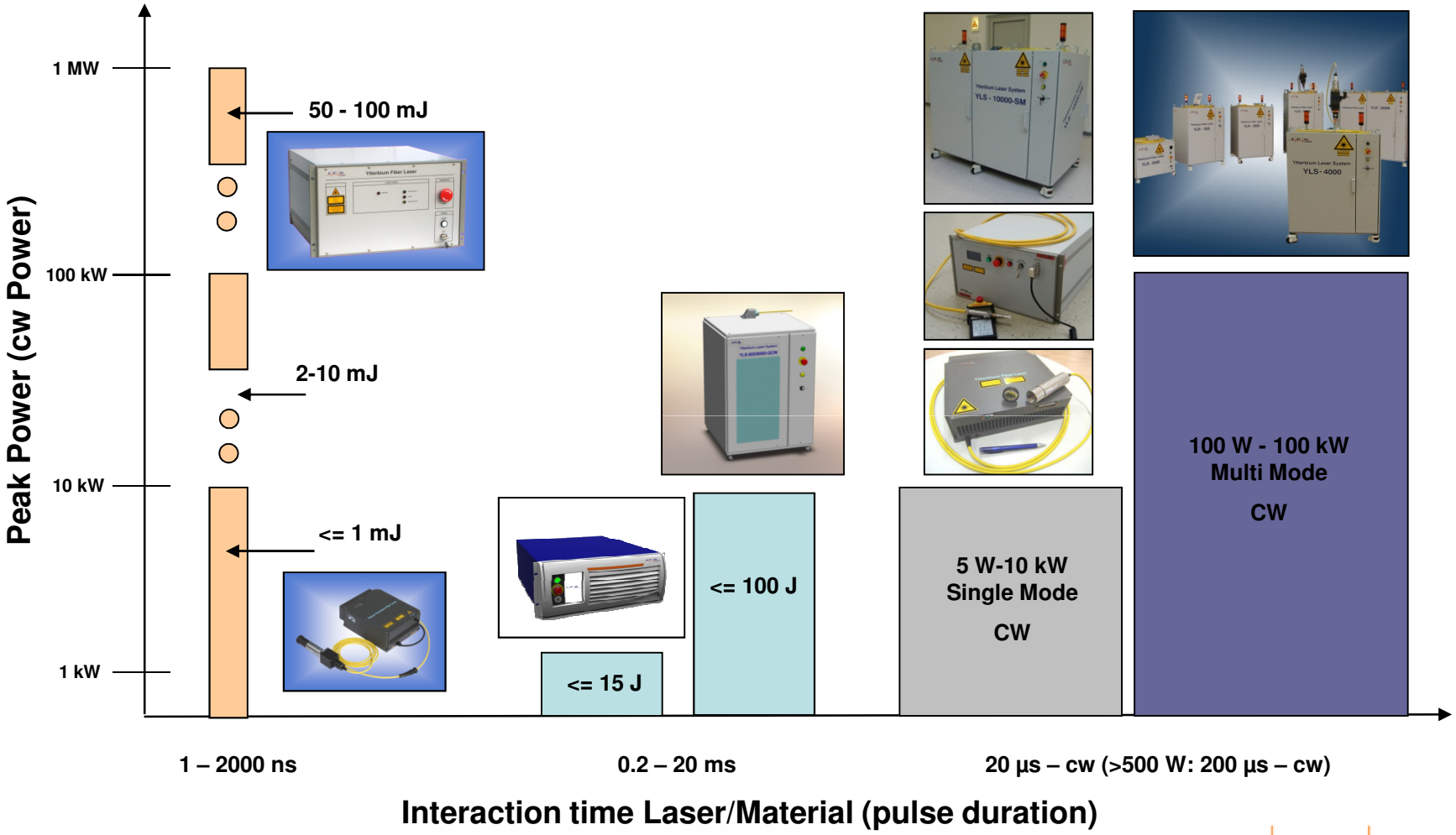
TEM_{00}; NA=0,06; M^2=1

Modularity of Fiber Laser



- Fiber laser modules can be stacked to the wanted power
- Laser power is scalable (currently 100kW) and upgradable at any time

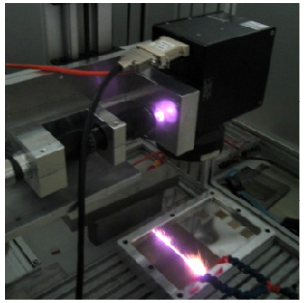
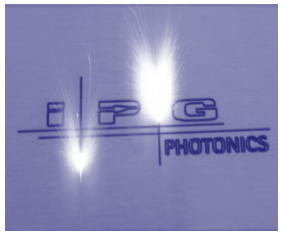
IPG Fiber Lasers for Material Processing

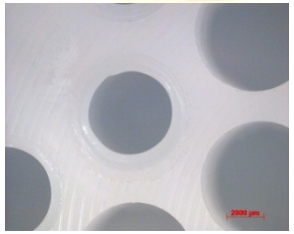


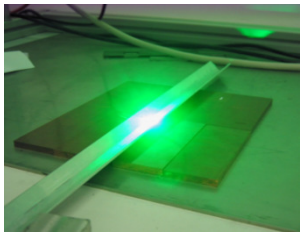
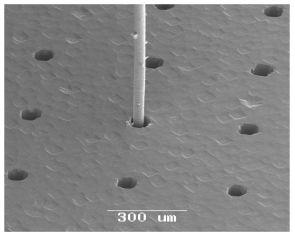
Copyright IPG Photonics

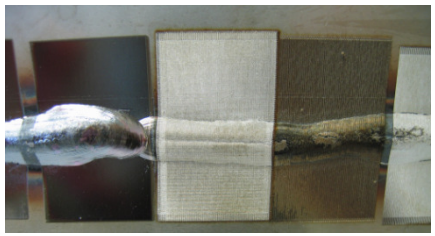
Applications of Fiber laser with low power

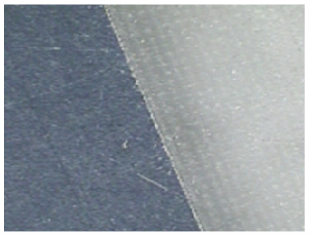
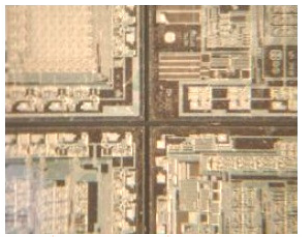
- Marking
- Ablation/Strukturieren
- Cleaning
- Drilling
- Remote Cutting
- Selective Laser Melting
- Laser polishing



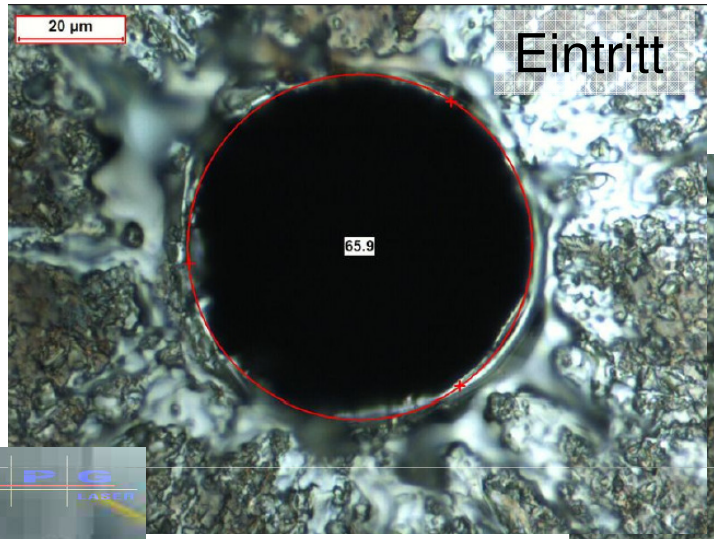


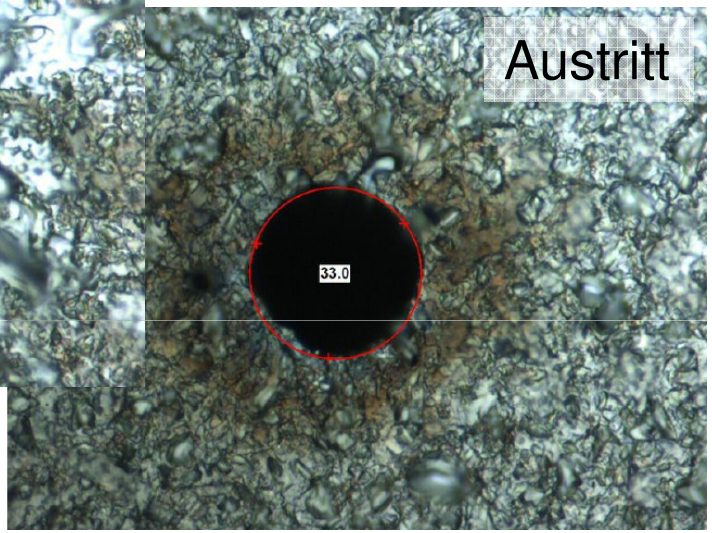



Percussion drilling „on the fly“

Example Silicon:

t = 200 µm





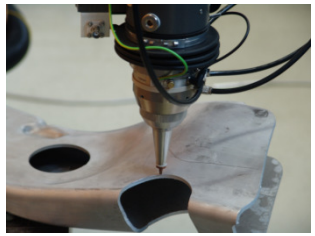
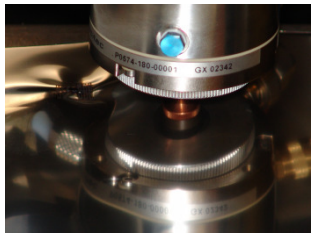
∅ = 65 µm

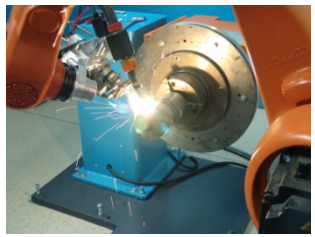
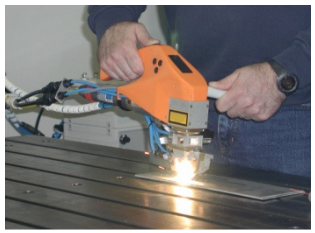
∅ = 33 µm

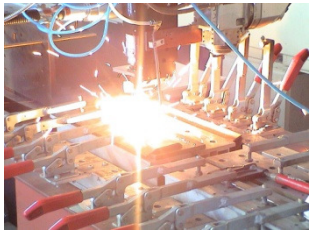
Drill Rate 3000 Holes/sec.

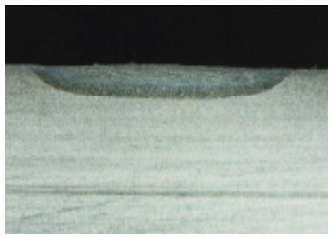
Applications of Fiber laser with high power

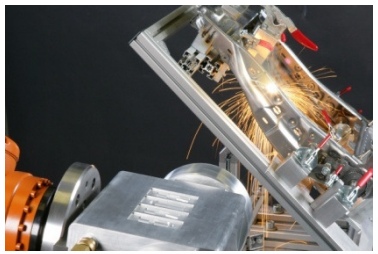
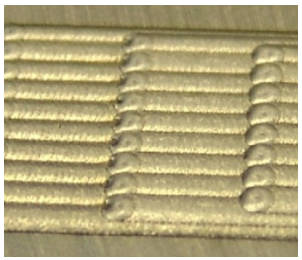
- Cutting 2D/3D (Remote)
- Welding
- Hybrid Welding
- Drilling
- Cladding
- Brazing
- Heat treatment
- Remelting
- Ablation

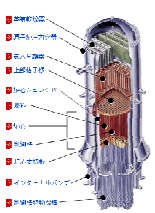
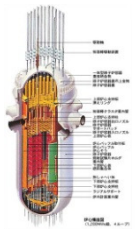





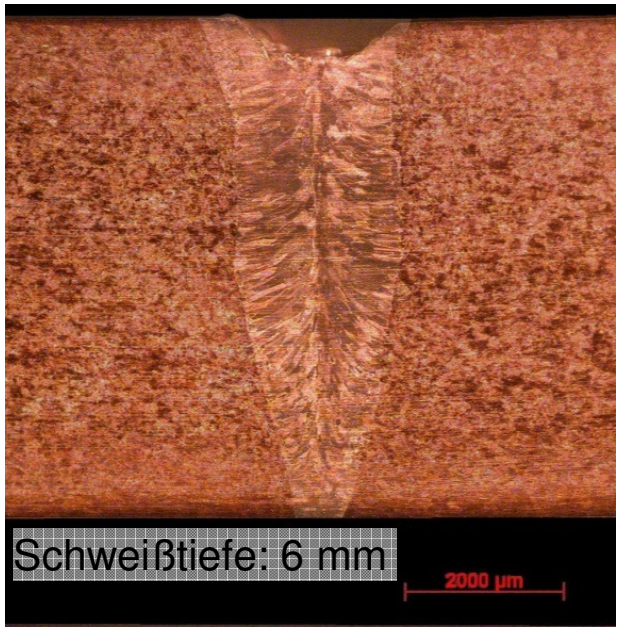


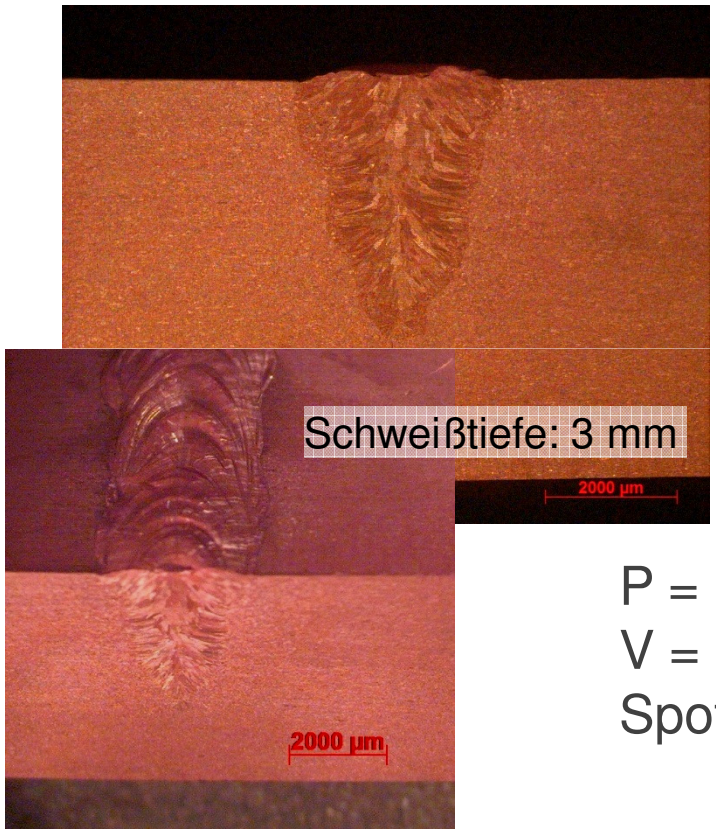
Laserwelding

Example Copper:



P = 20 KW
v = 5 m/min
Spot = 400µm

t = 6 mm

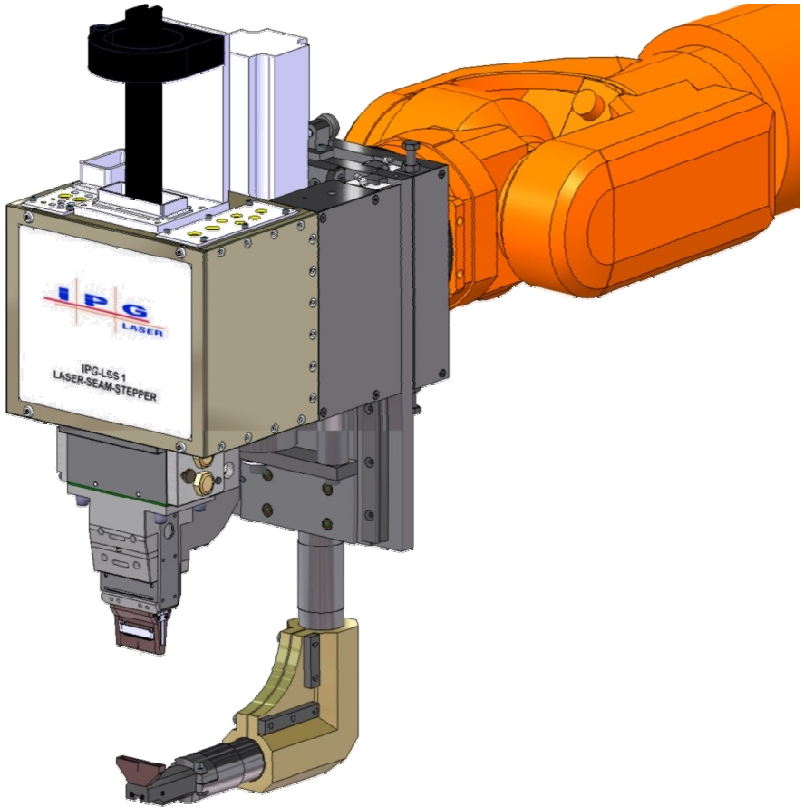


Applictions:
Electrical conducting, Tubes

P = 10 KW
V = 5 m/min
Spot = 400µm

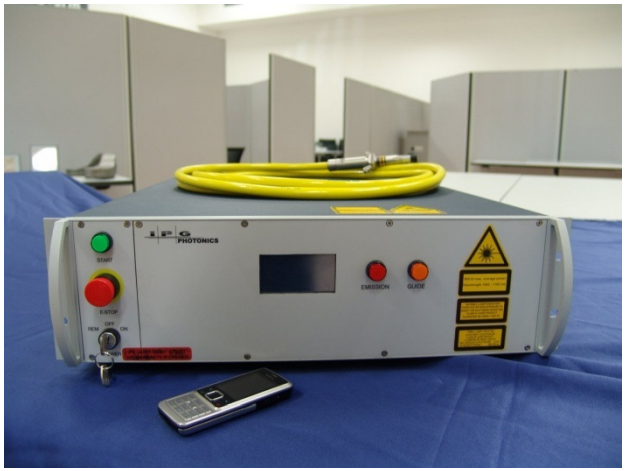
Laser Seam Stepper LSS1

Principle:



<u>Applications:</u>
component assembly in the car industriel

Specifications of ELR-120 & TLR-120



ELR-120-SM-WC

Output Power:	120 W
Emission Wavelength:	1567 nm
BPP:	1.05 mm*mrad
Modulation Rate:	1 kHz

TLR-120-SM-WC

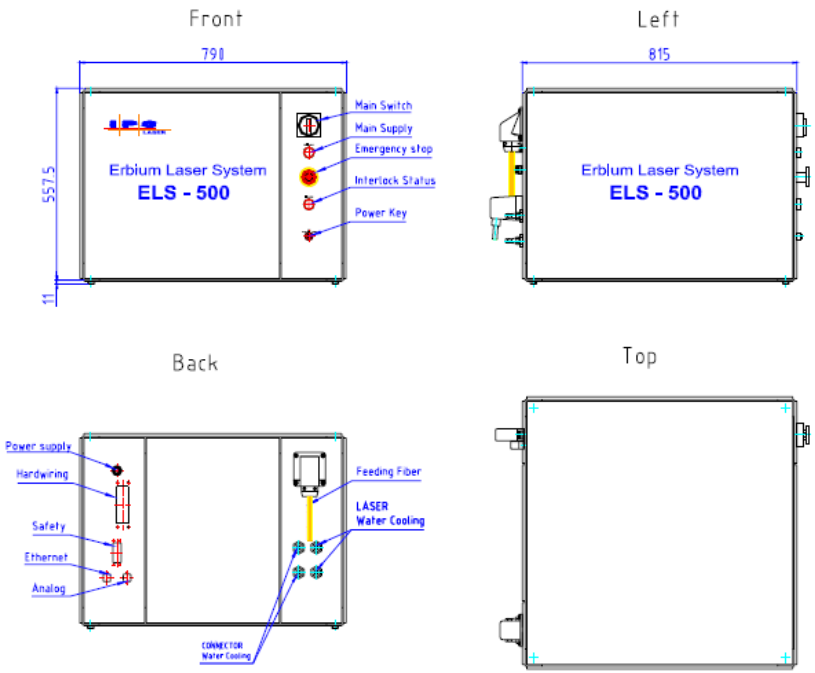
Output Power:	120 W
Emission Wavelength:	1940 nm
BPP:	1.05 mm*mrad
Modulation Rate:	1 kHz

Outlook

Deliver in the end of 2011:

ELS - 500

Output Power:	500 W
Emission Wavelength:	1550 nm
BPP:	2 mm*mrad
Modulation Rate:	2 kHz



Thank you for your attention!

IPG Laser GmbH
M.Stark
Siemensstr. 7
57299 Burbach
mstark@ipgphotonics.com
ww.ipgphotonics.com