

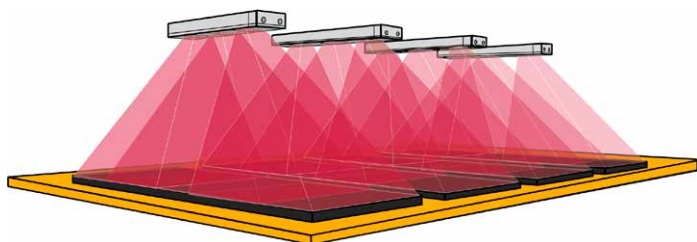
# Laserline LDL

## The Efficiency Champion in Heat Treatment



# Maximum Efficiency in Drying, Hardening, Coating and Sintering

Thanks to the direct photon emission of diode edge emitters, the systems achieve a wall-plug efficiency of over 56%, setting new standards in energy efficiency. The elimination of optical fibers reduces costs and at the same time improves reliability and user-friendliness.



## Applications

- > Drying of battery electrodes, polymers, fuel cells
- > Curing of powder coatings
- > Curing of polymer coatings
- > Heat treatment of wafers
- > High temperature sintering

Laserline LDL spot configurations

FWHM 42 mm ~160 W/cm <sup>2</sup>	FWHM 42 mm ~160 W/cm <sup>2</sup>	FWHM 42 mm ~160 W/cm <sup>2</sup>	FWHM 42 mm ~160 W/cm <sup>2</sup>

High degree of design freedom for the 'infinitely variable' laser spot – from fine line to large-area irradiation (spot format is predefined in the laser head) – line widths from 40 to 600 mm at 300 mm working distance.

# Over 25 Years of Experience with Direct Emitters

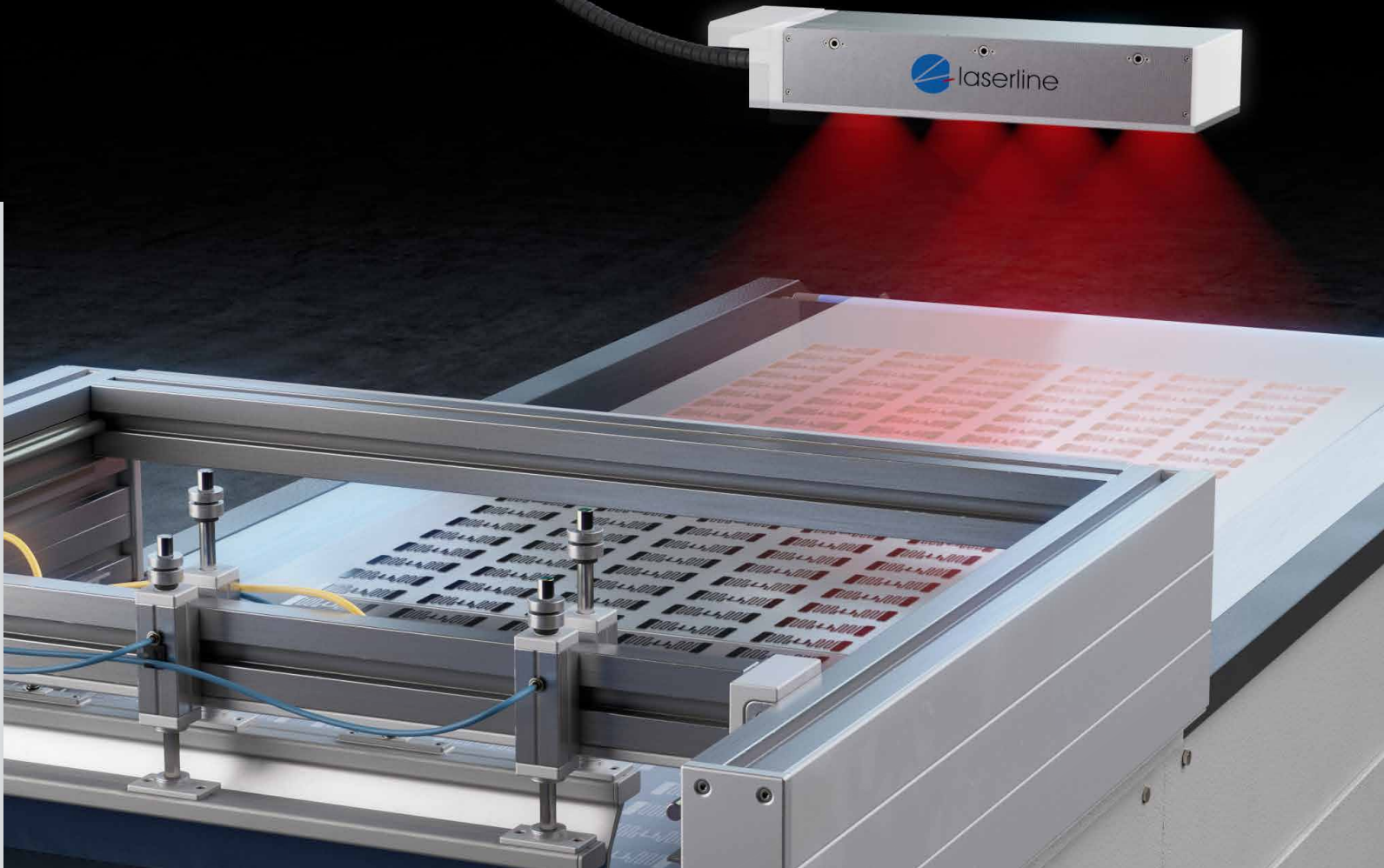
**1997**  
First Laserline patent:  
Modular stacking of  
diode laser bars and  
introduction of the first  
direct laser products

**1999**  
First multi-head system:  
100 beam sources  
in a single system for  
simultaneous welding  
with diode lasers (still in  
use today)

**2013**  
Series  
production of  
direct lasers

**2018**  
New technology  
demonstrator in a  
continuous processing  
machine features a  
compact size of < 50 mm

**2025**  
New LDL direct  
diode laser  
product range



# Modern Heat Treatment Solutions are Flexible and Inexpensive

## The Advantages at a Glance

### Energy efficiency

- > Highest wall-plug efficiency of over 56%
- > Targeted energy input through sharply contoured rectangular spots

### Modular

- > Scalable modules with segmented power adjustment
- > Individual control of laser emission zones

### Tailor made

- > Customized spot sizes and geometries, working distances and many other parameters

### Cost effective

- > No optical fiber
- > Integrative optics concept for precise and cost-efficient beam shaping

### Compact

- > Over 3x smaller space requirement compared to conventional laser systems

### Beam shape control

- > Adjustable segment power
- > Homogenization of spot geometries (large area, line, spot)

### Flexible and simple to implement

- > Working distance from 300 to 1500 mm
- > Large-area irradiation via ultra-wide angle projection

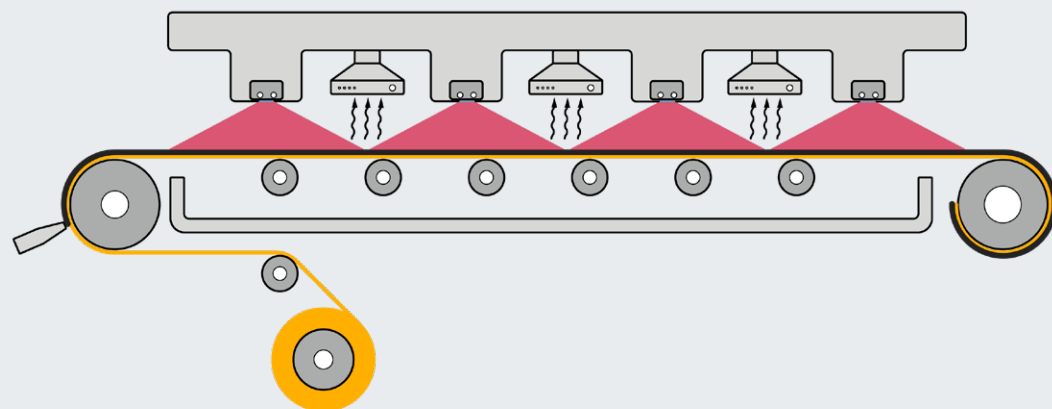
### Efficient and reliable

- > Based on patented direct diode laser technology
- > Based on over 25 years of development experience

### Guaranteed future proof

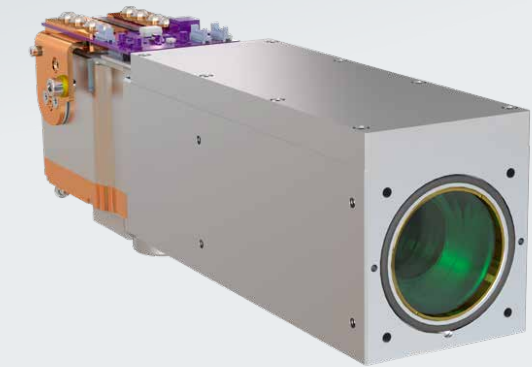
- > 2 year warranty for laser diodes
- > Upgrade up to 7 years possible

Laser drying with LDL direct diode lasers



## LDL Single

For large areas, lines and spots



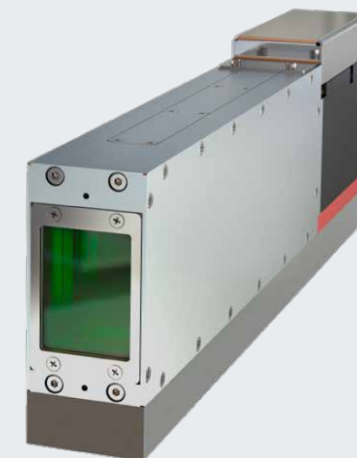
## LDL Multi

For larger areas



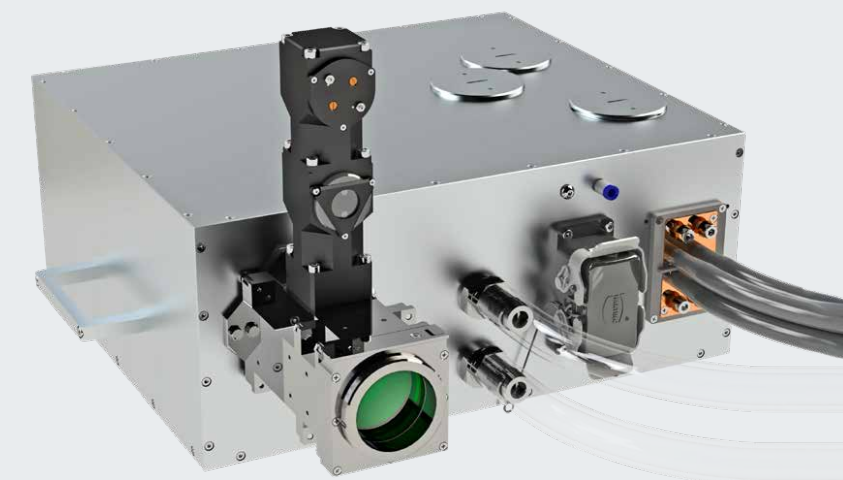
## LDL Customized

To achieve optimal results, we offer direct diode lasers with characteristics customized precisely to your requirements, including wavelength, output power, beam quality and integration parameters.



### Ultra-compact direct diode lasers

Direct diode lasers for heat treatment applications with a housing width of only 50 mm. Several processing heads can be cascaded to form a single system.



### Highly robust direct diode laser

Particularly robust and well-protected direct diode laser for harsh processing environments.

## LDL Direct Diode Laser Series

### Optical specifications

Max. output power	LDL 13,000	LDL 34,000
Max. laser power	13,000 W	34,000 W
Spot sizes*	300 x 400 mm <sup>2</sup>	600 x 600 mm <sup>2</sup>
Working distance *	300 - 1,500 nm, tailored to customer specifications, various configurations available	
Wavelength range*	980 nm	
Number of laser emission zones *	3 - 8	
Power range	10% to 100% of nominal power	
Rise time	< 10 ms (10 / 90)	
Homogeneity	± 2%	
Wall plug efficiency	> 56%	

### Mechanical specifications

Weight	Approx. 13 kg	Approx. 22 kg
Dimensions	Approx. 165 x 97 mm <sup>2</sup> (B x H) x customized head length	

### Features

Laser control	Individual control of laser emission zones
Monitoring	Integrated sensors for output windows contamination monitoring

### Operational conditions

Ambient temperature	10 - 45 °C (non-condensing)
Active water cooling	Fully integrated, recommended for 500 W cw or more

### Options

Additional components	External pyrometer for closed-loop temperature control
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### Warranty and lifetime

Warranty	2 years on laser system
Diode cooling	Active for highest power density and reliability
Uptime	Typically > 99.5%

\*Various configurations available, depending on customer specifications

Concerning functional safety, the laser conforms to DIN EN ISO 13849-1 and achieves the performance level d.

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