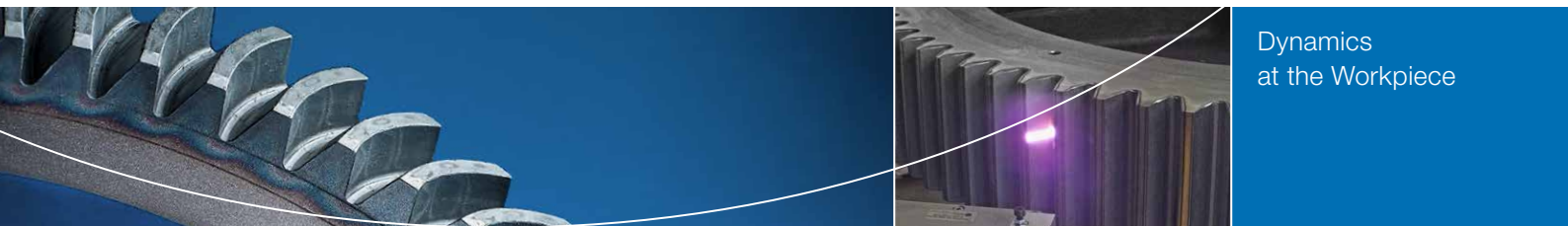


# OTZ Zoom Optics Always the Perfect Spot



Dynamics  
at the Workpiece



# Flexible, Dynamic, Modular



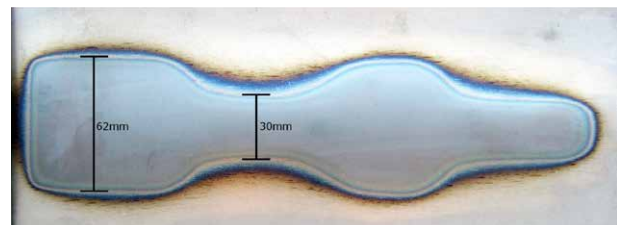
## Flexibility in the focus

For many tasks of thermal surface treatment or small series production, laser system and processing optics must be flexibly adaptable to cope with a wide variety of different geometries. The matching Laserline system solution is an OTZ zoom optics with adjustable and homogenized focus. Variable circular spots and line profiles belong to the possible intensity distributions as well as rectangular spots which can be adjusted in x- and y-direction independently.

For all zoom configurations the intensity distribution remains homogeneous and ensures a uniform energy input across the entire track width. Long setup times due to the change and the alignment of optical systems can be avoided with the highly flexible system. In particular for applications like laser hardening the OTZ zoom optics provide huge technical benefits due to the flexibility as well as the homogeneous intensity distribution.

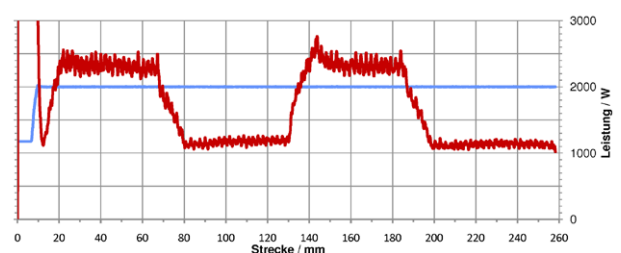
## Dynamics at the workpiece

The motorized adjustment of the optical elements allows a precise control of the spot radius, the track width or the focus length of the laser spot. Different processing tasks can thus be realized efficiently by dynamically changing the geometry in the X and Y direction – also during the ongoing laser process in closed loop-control of the laser. Additional water cooling and integrated temperature sensors allow for continuous operation at high power of up to 20,000 W and multi-shift operation. In particularly dusty production environments, the stable housing according to IP54 as well as the optional sealing air protects the optics from contamination.



Temperature / Power regulation:  
Constant surface temperature at variable  
track width

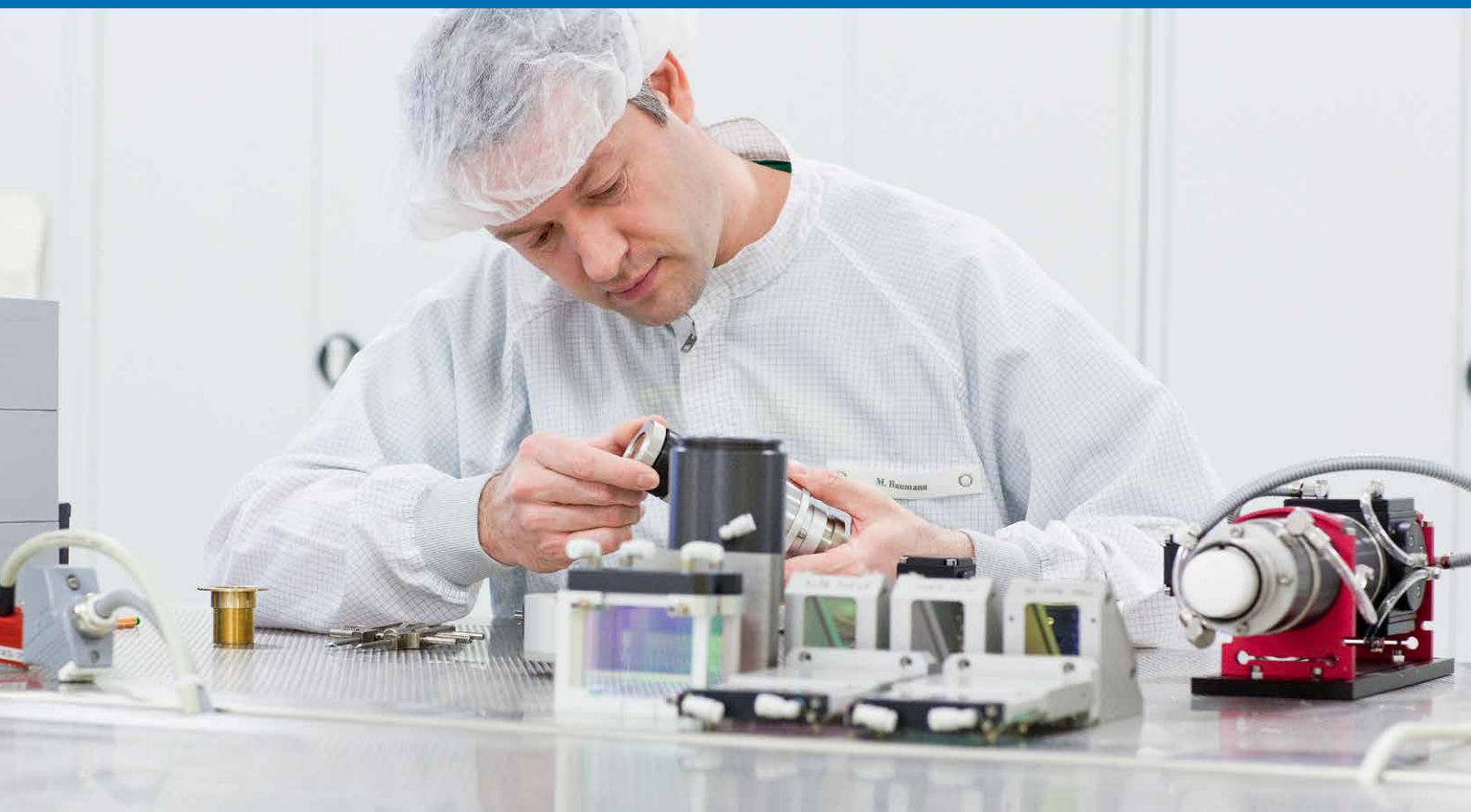
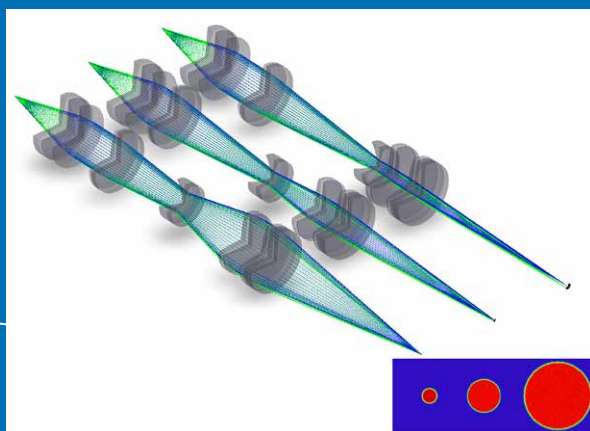
Blue line = temperature curve  
Red line = curve of laser output power

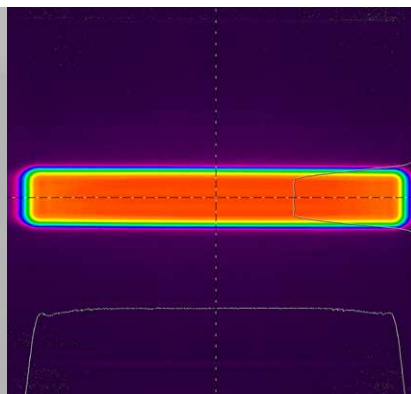
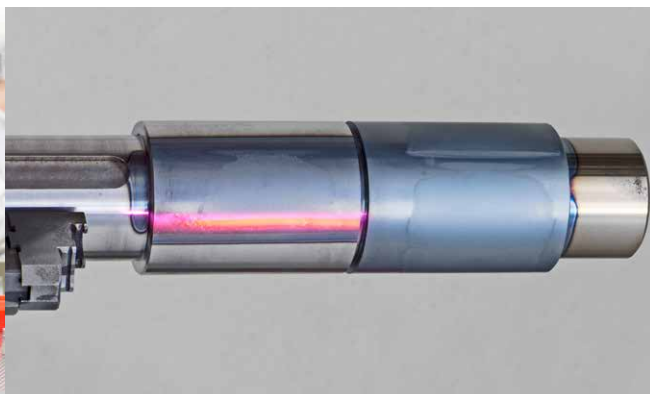




From laser beam source to the workpiece, Laserline offers industrial system solutions for laser materials processing. Processing optics that are perfectly attuned to our diode lasers are an important building block for the successful implementation of our customers' applications.

Raytracing of a zoom optics





Flexible focus sizes for a variety of different geometries



## Modularity in the system

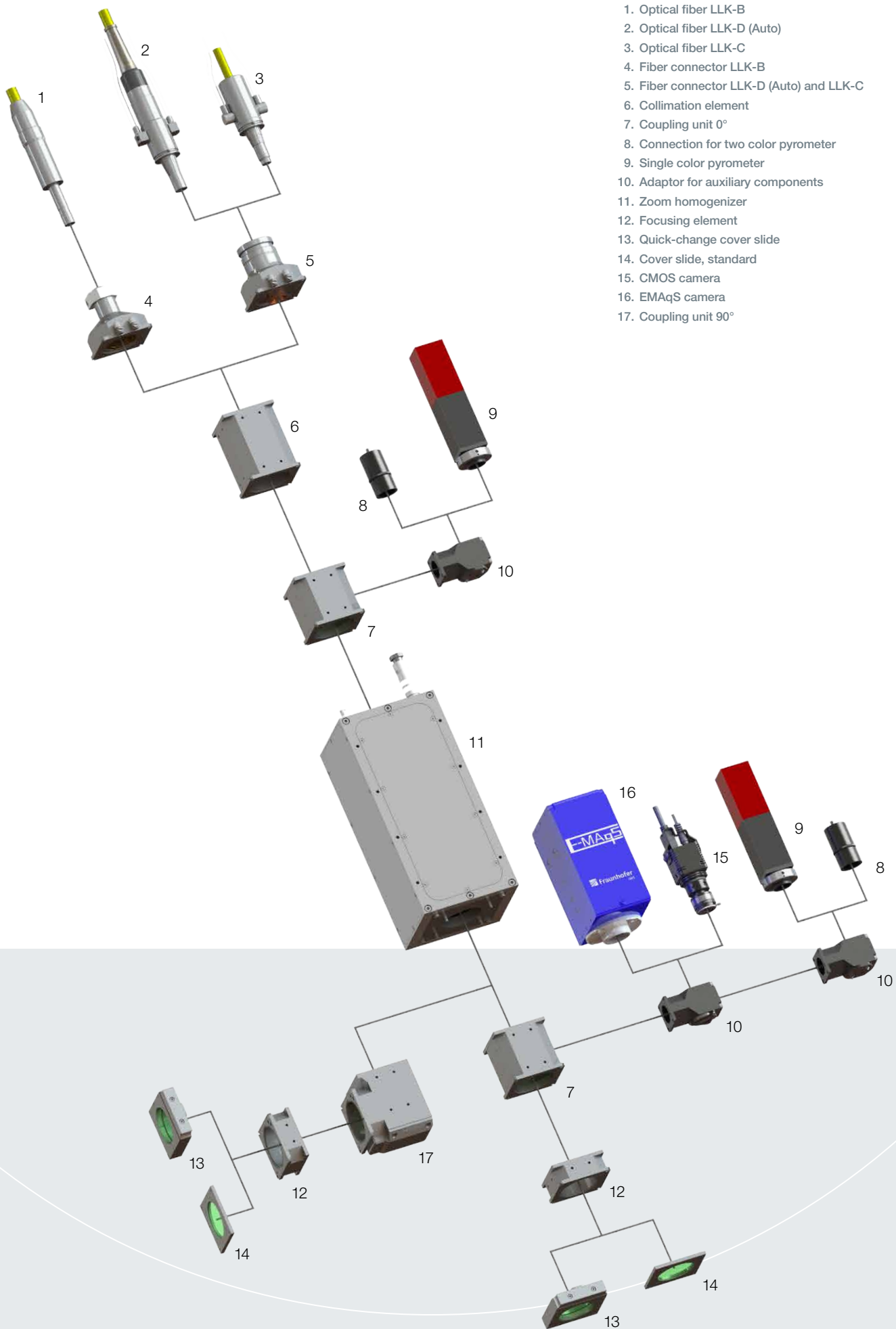
A kit of standardized modules allows the application-specific configuration of OTZ processing optics. A basic structure consists of a standard optical fiber coupling unit LLK-B/-D (item 4 and 5), a collimation unit (item 6), a motorized zoom optics (item 11), as well as a focusing lens (item 12) with protective cover slide (items 13 + 14).

The full compatibility of the Laserline optics range enables flexible functional extension with standard modules from the OTS series. To enable for example simple integration into hardening machines, the zoom lens can be equipped with a 90° coupling unit (item 17).

An optical pyrometer (items 8 + 9) can be integrated via the adaptor for auxiliary components and used for temperature-based laser power control for variable track widths. OTZ also offers full compatibility with camera-based temperature monitoring systems such as the EMAqS camera (item 16). The modular system enables a high-end solution for the heat treatment of complex components or plastic welding of large surfaces.

















Control of the zoom optics is easy via an analogue as well as an digital interface. This integrates very well into new or existing machine controls and can be extended with additional equipment from the Laserline range of products.

The consistent modular system of the OTZ optics supports fast and cost-efficient realisation of customer-specific solutions for special process requirements.











## Optics Series OTZ with motorized Zoom





### Variable line, examples

| Fixed spot size    |       |       |   |   |   |   |
|--------------------|-------|-------|---|---|---|---|
| 39                 | 26    | 13    |  |  |  |  |
| 19                 | 13    | 6     |  |  |  |  |
| 9                  | 6     | 3     |  |  |  |  |
| 3.3                | 2.2   | 1.1   |  |  |  |  |
| f 600              | f 400 | f 200 | 5   | ←————→ 58   |   |   |
|                    |       | f 400 | 10  | ←————→ 116  |   |   |
|                    |       | f 600 | 15  | ←————→ 174  |   |   |
| Variable spot size |       |       |   |   |   |   |

### Variable rectangle, examples

| Var. spot size     |       |       |   |   |   |   |
|--------------------|-------|-------|---|---|---|---|
| 80                 | 68    | 38    |  |  |  |  |
| ↑                  | ↑     | ↑     |   |   |   |   |
| ↓                  | ↓     | ↓     |   |   |   |   |
| 17                 | 11    | 6     |  |  |  |  |
| f 600              | f 400 | f 200 | 6   | ← → 38  |   |   |
|                    |       | f 400 | 11  | ← → 68  |   |   |
|                    |       | f 600 | 17  | ← → 80  |   |   |
| Variable spot size |       |       |   |   |   |   |

### Variable circle, examples

|                   |       |  |  |  |  |
|-------------------|-------|---|---|---|---|
| Fiber<br>200 μm   | f 200 | 0.4   | ←————→ 1.7  |   |   |
|                   | f 400 | 0.8   | ←————→ 3.3  |   |   |
|                   | f 600 | 1.2   | ←————→ 5.0  |   |   |
| Fiber<br>400 μm   | f 200 | 0.8   | ←————→ 3.3  |   |   |
|                   | f 400 | 1.6   | ←————→ 6.7  |   |   |
|                   | f 600 | 2.4   | ←————→ 10.0   |   |   |
| Fiber<br>1.000 μm | f 200 | 2.0   | ←————→ 8.3  |   |   |
|                   | f 400 | 4.1   | ←————→ 16.7   |   |   |
|                   | f 600 | 6.1   | ←————→ 25.0   |   |   |
|                   |       | Variable spot size  |   |   |   |

### Laserline Zoom Optics

| Mechanical specifications |                               |
|---------------------------|-------------------------------|
| Weight*                   | < 11 kg                       |
| Dimensions* (L x W x H)   | 135 x 137 x 300 mm³           |
| Fiber-coupling unit       | LLK-B (15 mm)<br>LLK-D (Auto) |

| Optical specifications |                            |
|------------------------|----------------------------|
| Max. laser power*      | 20,000 W                   |
| Numerical aperture     | NA 0.1 or NA 0.2           |
| Focal length           | 200 - 600 mm               |
| Fiber diameter (LLK)   | 200 - 2,000 µm             |
| Spot sizes             | See below, more on request |

\* Abhängig von Konfiguration und Zoombereich

| Operating conditions  |  |
|-----------------------|--|
| Ambient temperature   | 10 - 45 °C   |
| Humidity              | Max. 85% non condensing  |
| Active water cooling  | Recommended above 500 W cw   |
| Motor control         | Analog positioning operation (0 - 10 V), 5 V TTL, RS232 PC control |
| Motor connection data | 24 V, 3 A supplied by customer                                     |

| Options                      |  |
|------------------------------|--|
| Auxiliary components         | Pyrometer, CMOS camera, camera-based temperature control systems     |
| Coupling unit and interfaces | Single, double, C-Mount, SM1, M40 x 1.5<br>Option: 90°-coupling cube |
| Air supply                   | Sealing air  |

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